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[OFFICIAL NOTICE.]

First Annual Meeting, American Gas Institute.

AMERICAN GAS INSTITUTE,
OFFICE OF THE SECRETARY,
NEW ALBANY, IND., Aug. 27, 1906.

The first annual meeting of the American Gas Institute, composed of the merger of the Ohio, the American and Western Gas Associations, will be held in the Auditorium Hotel, Chicago, Ills., Oct. 17th, 18th and 19th, 1906, and will be called to order by Mr. B. W. Perkins, Altoona, Pa., President of the Ohio Gas Association, who has been selected as presiding officer.

The Auditorium Hotel offers rates to delegates as follows:

Single rooms.....	$2.00 per day and up.
Two in a room.....	3.00 per day and up.
Single room with bath.....	3.50 per day and up.
Double, or two in a room with bath....	5.00 per day and up.

Those expecting to attend the Convention are requested to secure rooms in advance of the meeting.

The following Passenger Associations have granted reduced rates on the certificate plan of 1½ fare for the round trip, plus 25 cents for each railroad certificate vised by the representative of the Passenger Associations, who will indorse the certificates: Central Passenger Association, Western Passenger Association, Trunk Line Association, Eastern Canadian Passenger Association, South Western Passenger Association, South Eastern Passenger Association, New England Passenger Association, excepting the Eastern Steamship Company.

These Associations include all the territory of the United States, as far West as Colorado.

Membership blanks have been sent to all of the members of the three above Associations.

It is requested that members avail themselves of the opportunity to become charter members at the very earliest moment, insomuch as 60 days has been decided as the limit for acceptance.

Acknowledgments of the receipts of applications have been mailed to all of those who have forwarded their application to the Acting Secretary. Failure to receive such acknowledgment is indicative that your application for membership has not been received. The Acting Secretary urges upon every person, who wishes to become a charter member, that they lose no time in sending in their application. The qualification for membership is as follows:

From Section 8 of the Constitution.—"Charter members shall be such of the present membership of the American, Ohio or Western Gas Associations as shall be certified by the officers of the same to the Directors of the Institute as qualified respectively for Active, Junior or Associate membership, provided, that to become a charter member it shall be necessary for each person so certified to make application to the Directors of the Institute within a period of 60 days after notice has been sent him of the formation of the Institute."

In the judgment of the joint committee, appointed by the American, Ohio and Western Gas Associations to organize the American Gas Institute, no person delinquent for dues in either of the above Associa-

tions shall be eligible for membership in American Gas Institute until such delinquencies are paid.

From Section 5 of Constitution.—"To be eligible to Active Membership, a person must be at least 26 years of age, and be an officer or other employee of a gas company, or a consulting gas engineer, or an employee of a consulting gas engineer. He must be competent to act efficiently as the manager of a department of a gas company's business, and must have his chief interest in the gas business directly connected with the manufacture, sale or utilization of gas, and not the manufacture or sale of apparatus or appliances used by gas companies."

From Section 6 of Constitution.—"To be eligible as a Junior Member, a person must be over 20 years of age and be in the employ of a gas company, or of consulting gas engineer, and must be qualified either by experience or education to hold a responsible position under such employers."

From Section 7 of Constitution.—"To be eligible as an Associate Member, a person must be engaged in a pursuit which constitutes a branch of gas engineering, or to be otherwise qualified to assist in promoting the objects of the Institute."

All charter members are exempt from membership fees. The annual dues, however, are payable in advance as soon as the permanent organization of the Institute is effected.

For those who are not members in good standing, in either the Ohio, American or Western Associations, and who are qualified to become members, the following membership fee, including the first year's dues will be charged:

Active membership	$25
Associate membership	25
Junior membership	10
Annual Dues.	
Active membership	$10
Associate membership	10
Junior membership	5

A banquet will be provided for the Association members under the usual conditions, which have heretofore prevailed, each member attending paying an amount to be determined upon. The details as yet are not completed.

I would request again upon the members of the Ohio, American and Western Associations, that they attend to the notice received from the undersigned in reference to sending in their application.

The undersigned will be pleased to answer all communications in reference to the meeting, and to send membership applications to any not eligible for charter membership, who may wish to become members of the American Gas Institute.

JAMES W. DUNBAR,
Acting Secretary.

BRIEFLY TOLD.

THE HEARING BEFORE THE MASSACHUSETTS COMMISSION RESPECTING AUTOMATIC OR SELF-CLOSING GAS BURNERS.—During the last session of the Massachusetts Legislature an order was passed that directed the State Board of Gas and Electric Light Commissioners to conduct a certain investigation. The nature and scope of the inquiry had to do with determining whether or not it was feasible and advisable to equip gas consuming devices with automatic shutting-off mechanisms. And the Commissioners were instructed to forward their findings in the premises to the next General Court, which body was to elect whether the adoption of such devices should be made compulsory on companies supplying gas. The hearing was held some days ago, and it looks to us that the Commissioners can have little choice as to the report they will submit. As per our mention of the sitting, and a brief resume of the testimony rendered thereat will be found in our current item columns, the hearing attracted no attention from the general public, thus showing that the "interest" which prompted the passage of the order was not "of, from, to or by" the gas consumers, no matter what other involved purpose had prompted its passage. The gas interests were ably represented by Mr. William A. Wood, Engineer to the Boston Consolidated Gas Company, and by Mr. G. T. Cortis, Manager of the Boston Gas Appliance Exchange. The testimony of both gentlemen clearly developed the fact that the gas companies of Massachusetts, if the testimony of the capable engineer of the largest concern of the kind in New England could be counted as competent evidence, were not only willing but anxious to apply a self-closing device, the only proviso being that the remedy should at least be not worse than the disease. Mr. Wood's relation of the facts showed that his Company had tested many automatic shut-offs, only to find them inefficient in all instances, and positively adders to the dangers in some examples. However, the order, the hearing and the report (when issued) all go to show that none will be better pleased than the gas companies if a device of the sort wished for that will answer the requirements can be brought on forthwith. The bill, even if it were put forth as a "strike feeler," has served a useful purpose, since it proved beyond a doubt, through the testimony given, that the gas suppliers are as anxious for the best protection of gas users as the latter are desirous of such protection.

TAKE BACK THE DEPOSIT THOU GAVEST.—That section of Greater New York, known on the local maps as the Borough of Brooklyn, still remains noted for the sincerity and simple mindedness of many of its inhabitants, in fact we may add that its retention of such characteristics is still colored and flavored with the suspicion that "things are not always what they seem." In witness whereof we relate the following narrative: A resident of the aforesaid borough whose home is in the "First Ward," recently received a request from the Brooklyn Union Gas Company that he call at its office and receive back a deposit of $10 which the Company required from him some years ago, or at the time he applied for gas service, as a guarantee that he would pay for the gas supplied. This notice was a puzzler to its recipient who, rather than apply to the Company for information, inquired of the Editor of the Brooklyn *Eagle* as to the why and wherefore of the Company's solicitude. In turn the Editor sent a reporter to Secretary Rossiter, and he explained the situation thus—the consumer could have done this just as well as the *Eagle's* man did. "On these deposits," said Secretary Rossiter, "the law compels us to pay 6 per cent. interest. But if we find that a man pays promptly for a certain period, and that his rating is good, we are willing to have him for a customer without a deposit, as it is to our interest to reduce the sum deposited with us and bearing interest at 6 per cent. So you see the citizen who wrote to the *Eagle* asking for an explanation as to why his money is being returned can see that our action is a tribute to his honesty and fair dealing."

NOTES.—

A BRIEF message from Mr. Carl H. Graf, General Manager of the Indianapolis (Ind.) Gas Company, informs us of the sudden death, on the morning of the 19th inst., of Mr. John R. Pearson, formerly Vice-President and General Manager of the Indianapolis Company.

MR. J. A. BARHAM has been granted a franchise for the operation of a gas works to supply the districts of Old Point Comfort, Hampton Roads and Phoebus, Va., the works to be constructed at Hampton Roads. The contract for the plant has been awarded to Mr. F. D. Moses, and it comprises the placing of two 4 foot sets of improved Lowe type of water gas apparatus (these sets will be put in by the United Gas Improvement Company), a holder up to retaining 30,000 cubic feet, purifiers, station meter and other necessary apparatus. The contract also embraces the putting down of about 18 miles of mains. The work is to be completed by December 1st, and the main party in interest is the Public Service Corporation of Virginia, as represented by Mr. J. A. Barham.

MR. HENRY F. HICKS, of Worcester, Mass., has been promoted to the position of traveling representative of the General Gas Light Company in the New England division of its territory. Mr. Hicks has been connected with this Company for some time, and his promotion certainly proves that the Company and the man are suited to each other.

AT the annual meeting of the Standard Gas Company, of Matawan, N. J., the officers elected were: President, Wm. R. Beal; Secretary, Charles A. Geran; Treasurer and General Manager, William A. Richards.

WE understand that Messrs. Lee, Higginson & Co., of Boston, Mass., have secured control of the Southbridge (Mass.) Gas and Electric Company.

"THE Directors of the Lynn (Mass.) Gas and Electric Company recently entertained a certain select party of prominent men from Saugus, Nahant, Swampscott and Lynn at the Breakheart Farm in Saugus. The entertainment was a complete success, and those who would be enlightened on the proper management and care of an auto are respectfully referred to Brother Prichard. He is a believer in the famous Italian proverb that he who travels slowly travels safely, and he who travels safely travels far.—C."

ON the 1st prox. the net gas rate at Omaha, Neb., will be put at $1.15 per 1,000 cubic feet, a concession of 10 cents per 1,000.

The American Gas Institute.

[A paper prepared by MR. F. H. SHELTON, Philadelphia, Pa., for the Fourteenth Annual Meeting, Pacific Coast Gas Association.]

It it with pleasure that I accept the invitation of the officers of the Pacific Coast Gas Association to briefly give you, in convenient form, the history and purposes of the American Gas Institute; for, believing as I do in the great advantages to all gas men to be gained by the promotion of this new Association, I am glad to give you all possible information, feeling certain that the more your members understand about it the more will their support be enlisted.

The theory of concentration, or of action in united form, is as old as the history of mankind, and needs no argument in its justification. It is that theory upon which the new Gas Institute is founded.

For many years it has been realized by numerous men in the business that the several Gas Associations, worthy as they are, were and are yet not getting the results that should be possible, or the better results of working as a united and single organization. I believe that the first public expression of this feeling appeared at the Twenty-second Annual Meeting of the American Gas Light Association, at Washington, D. C., October, 1895. At that time the Committee on Federation that had been appointed in the preceding year to report on some plan of union, through Mr. Walter R. Addicks, a most competent and earnest working chairman, presented an extensive plan in detail for federation of the several associations. While this plan was far short of what now seems desirable and possible, and provided for membership through associations, and not by individuals (which would make a small State association as powerful as the largest body—a great defect), it was chiefly killed, because of the prominence of one part of the plan, that of publishing the proceedings, in quarterly form, by the federation. This aroused the opposition of the GAS JOURNALS. The first motion on the floor was to indefinitely postpone any action on the report, and in the heated discussion that followed, the question of who should print the proceedings received almost the sole attention of the speakers, and the real advantages of federation were scarcely gone into. The plan was killed and much hard and earnest work of the committee went for naught, and nothing more on the lines of uniting appeared until 9 years later.

In the last few years, however, the objections, not to say evils of the methods attaching to Gas Association conditions prevailing in the United States, have become more and more pronounced, and so impressed themselves upon me that I concluded to make it the principal feature of a presidential address to the Western Gas Association, at its Twenty-seventh Annual Meeting, St. Louis, 1904. My argument as to objectionable features and possibilities of improvements can best be covered by reading up that address, to be found in the usual published proceedings, and need only be referred to here as going into the lines of the unnecessary duplication of expense by maintaining nine secretaries for nine different associations, the publication of nine sets of proceedings, the other expenses multiplied by nine, and particularly the duplication of gas work by different associations; the setting up of different standards, and the otherwise working oftimes at cross purposes. In addition the matter of some jealousies in the promotion, advancement and publicity features of different associations was referred to as an evil that could not be denied.

The above meeting of the Western Gas Association was immediately succeeded, on June 15th and 16th, by a Congress of all of the American Gas Associations, and one of the papers before that Congress was upon the subject of "Gas Association Work," by Mr. Henry L. Doherty. This paper, with the characteristic ability and fullness of the writer, went into the subject at great length and was accompanied by numerous tables, and should especially be read by everyone interested in the history of this movement towards a better working basis, or who is desirous of becoming familiar in detail with the weakness of methods that many believe are now passing, and with the possibilities of new and united methods that we trust are coming. It may be found in the proceedings of the "Congress of Gas Associations of America," pages 154 to 211. In that paper Mr. Doherty particularly pointed out the various features and phases of the gas business; the unsatisfactory conditions on many points in the manufacturing and distribution departments; the irregularities and inequalities of statutes, legislation, tax valuations, etc.; the lack of standards in and unnecessary varieties of domestic appliances, consuming energy and wasting economies; the differences of opinion as to the justifiable degree of development for gas enterprises, owing to lack of standardised data; the inefficiency of gas literature, and specific reference data on scores of practical gas questions; the lack of sufficient educational facilities for the younger gas men; the lack of support from many gas companies towards gas associations, and the small percentage of income available for association work, compared with the resource of the business. Numerous other criticisms and objections to present methods were pointed out. In contrast thereto an ideal association was outlined from the point of view of Mr. Doherty, whose prime purpose would be the bettering of all such conditions, and which ideal plan was most comprehensive and ambitious, in contemplating over and above present features of gas associations, various special departments or sections, such as chemical, producer gas and the accounting, etc., together with company memberships, with dues based on population or output, and many other features believed to be of a progressive nature.

The result of the presentation and active discussion of the two papers, as above, at the St. Louis meeting of 1904, was undoubtedly the awakening of at least the question in the minds of those present, of whether the time had not come when something should be done, and this took form in the appointment of a committee by the Gas Congress, of 24 men representing the best elements in the gas industry of the United States, and comprising 2 members from each of the associations, and 3 members from the commercial or trade interests at large. This committee was charged with the duty of drawing up a plan—if in its judgment feasible—providing for a single gas association, to be composed of the men engaged in the gas industry of North America. While many men believed that something would come out of it, there were equally many who believed that for various reasons the associations could not be put together, and the committee started off in its work in the face of skepticism in some directions and positive antagonism in others.

It is rarely that anything worth while, and which involves the assimilation of separate interests, is accomplished in short order, and in this case it has taken some 2 years to get to the results hoped for. But the lapse of that time in a sense was to the advantage for the movement, for undoubtedly the further consideration of the subject by men who had not given much thought to it until it was started up, made such recognize the arguments for and need and desirability of better association work, and hence become more responsive to the final plan when proposed. Through 1905 the committee labored, and by fall had evolved a plan of merger or union for the American Gas Light Association, the Western Gas Association and the Ohio Gas Light Association, as feasible and desirable, which plan was reported back to the American Association, at its meeting in October, 1905; to the Ohio, at its meeting in March, 1906; to the Western, at its meeting in May, 1906. The report of the committee as to the proposed plan is probably familiar to most of you, and may be found in the published minutes of the respective meetings above, together with the proposed Constitution of the American Gas Institute then forming.

The committee was but human in feeling a marked sense of satisfaction in finding that (after a full presentment of the plan to each Association, first through the Board of Directors, where full discussion ensued, and thence through the Board of the Association itself, with a favorable recommendation) each of the three Associations above, after full discussion on the floor, successively, decided to participate, and each created a committee, authorized and directed to wind up its affairs, and to do everything necessary to join in the Gas Institute. These three committees met in July last and organized the American Gas Institute, under the powers vested in them under date of July 10th. The necessary steps for the first joint meeting of the three constituent associations were taken or provided for, and at this meeting the first regular meeting of the American Gas Institute will be held in the central metropolis of the country—that is, Chicago—on October 17th, 18th and 19th. Such in brief is the formation history of our new association.

It can well be appreciated that it was a most difficult question for the committee to determine how far to go in introducing new features, or in making the association different (that is, in what respects and to what degree) from the present associations, with which we are familiar.

The plan of Mr. Doherty in many respects is far beyond that upon which the Gas Institute starts off. While in my opinion the great majority of the features desired by Mr. Doherty are excellent, and in some form or another will ultimately be followed, it is equally my opinion that if too many new and radical features were introduced, the plan would not not enlist the support of the gas industry, which support is obviously vitally necessary. The other members of the committee felt the same, and that it would be better, above all things, to *first* unite and get together. With this step accomplished a long step

would be taken towards doing away with past objections, and the united gas men working in a single organization would be in the best possible position to take up successive features as proposed by Mr. Doherty, or by anyone else, and to adopt them or otherwise, as might seem to them best. And to Mr. Doherty's credit I want to clearly bring out that while the first plan of merger is far short of what he has outlined and desired, he withdrew all objections and turned in to facilitate the general movement in every way.

Generally speaking, the Constitution of the American Gas Institute covers an association modeled on largely present lines. As it stands, the having of the one and new association will result in the immediate benefits of concentrated income, minimized expense, single, and no duplication of work by committees on special subjects, and the general advantages of an association of three times the membership of past associations, backing up and standing together on questions of legislation, or other matters that may develop, or where united position is desirable, as in showing at expositions, or joining with other bodies, etc.

Having thus gone on a united basis it will be directly up to the management of the new Institute to next steadily progress by adopting new and better features. If company memberships and dues based on population or outputs are desirable, such features will undoubtedly be proposed at an early date and adopted or rejected, and so with every other supposed improvement in method or work or purpose. Water will not rise above its level. If it is potentially within the capacity and ability of gas men at large to do better work and rise above past levels, the Gas Institute surely affords the opportunity and easiest channel. If it is not within them, it will be but little more than the old associations under another name.

The dangers arising from the Gas Institute, while not many, should be referred to. An organization sometimes gets into a rut of being run by one set of men. As a rule this is a compliment to the controlling forces; who are apt to dominate, if the brainiest and most forceful. However, if in the American Institute such tendency should develop, or a feeling exist that the management is controlled by a clique and nominations are distasteful, the membership at large has complete power to meet such conditions, for under the Constitution 20 voting members can make nominations, aside from the regular nominating committee.

The Directors also are bound to submit to the meeting any proposed change of Constitution demanded in writing by any 10 members, and the Secretary is bound to call even a special meeting, if 100 members (whether active or associate) request such in writing. The Institute, therefore, is surely a democratic, self-governed body, as far as all reasonable provision to that end can be made.

One danger is that the larger the body the greater the tendency for the individual member to leave the work to be done by someone else, on a general feeling that there are enough workers somewhere or another, and that he need not go to any personal effort. Such attitude will be fatal. The mere joining of the American, the Ohio and the Western Associations into one body under a new name will not advance Gas Association work one iota, unless the membership—that is, the individuals personally—not only continue to do the work that each has done heretofore, but in fact do even more in order to get the benefit of concentrated effort. Most of the members are dependent upon the gas business for a livelihood. The gas business in turn, in some instances, is dependent upon, and in almost every instance is at least benefited by, the development of the questions that the Gas Institute will take up. Questions of self-protection against unnecessary and unfair legislation, against inequitable taxation, against unwarranted competition in the face of existing reasonable service; questions of greatly improved efficiencies and economies in operation, meaning more money to the companies and more salaries to Institute members; questions of the value of experimental processes; questions of the education of young men in the business, who in succeeding the present men will be the custodians of the properties we are managing; these, and innumerable questions that might be cited, should and will receive the attention of the Gas Institute, through its management, officers and special committees appointed for the purpose. It is not only the duty of every member of the Institute to honestly and earnestly give thought to working out and pushing these things along, but his duty as well to honestly and earnestly help, by personal willingness to work on committees, investigate designated subjects, etc. More than that, it is directly in the interest of his pocketbook. The relation of the other Associations, such as your Pacific Coast Gas Association, the New England Association of Gas Engineers, and the various State Associations, and of other bodies such as the Commercial Gas Association and the Natural Gas and the Illuminating Engineers, etc., is one directly pertinent.

The committee shaping the Institute gave a great deal of thought to this point, and were a unit in the conclusion that the first step in getting all of the gas bodies, roughly speaking, into concerted position, should be a merger of the three larger ones operating as general associations, without any attempt or thought of the discontinuance of the State and purely district associations. It was recognized that these last two forms of gas organization can do local work and meet local questions to better advantage in many cases than any general body. At the same time, it is manifestly desirable that such associations co-operate and work with the Institute on some mutually advantageous basis, and this has been met, it is believed, by provision 49 of the Constitution, providing for agreements for co-operation. The entire nature of such agreement has not as yet been shaped out, but it contemplates that all of the advantages of membership in the Institute, of alliance with it, of its backing, of its information available, etc., will be available for the State or local associations *in return* for an agreement with the latter, that it will confine its membership to persons directly identified with gas interests within its district, or State, and will consult with the Institute before undertaking any original work, and will do each year in co-operation with the Institute a certain amount of original work.

Under such arrangement the State, or district, association becomes entitled to one seat on the Board of Directors of the Institute. It will be seen that with such arrangement, the relationship of the State and district associations to the Institute will be the same as that of the various States of the Union to Congress at large, the latter being the great governing body, but supported by and working with the individual and local states or associations and without interference with state rights.

In closing the subject of the union of gas associations at the Gas Congress in St. Louis, I made the statement, after the appointment of the Committee to take up the question, that "We can leave with the feeling that the biggest work, and the greatest thing accomplished by this Congress of Gas Associations, is the beginning of a plan, which ultimately ripen into an organization, bringing together in one body all the gas men in the country. We will do it gentlemen! The time is nearer than I had dared to believe a few weeks ago." From that time until this, those strong in the belief that uniting was the right thing to do, have given all their time and effort unselfishly, and in a large measure continuously; they feel that their work is now largely done, through the results of this formative period, and that that prophecy has been fulfilled.

In delivering to gas men at large the American Gas Institute, as created and organized and launched, in this year of 1906, it will now rest with the gas men of America to take up this work of progression, and get, under the Institute banner, the bigger and better results that so many believe are in the wood. And, knowing the enterprise, the character, the willingness and the breadth of view of the Pacific Coast Gas Association, it seems to me certain that the Institute will be able to count your Association as one of its foremost and most staunch co-operating supporters.

Value of System in the Management of Gas Companies.

[A paper read by MR. RICHARD SCHADELLELEE, Grand Rapids, Mich., at the Grand Rapids Meeting, Michigan Gas Association.]

The success of any business depends largely upon a good system of conducting it, but in a complex business like ours, comprising many different departments, system is indispensable in order to produce the best results.

The time was when the gas manager could depend largely upon a high price for his product to earn dividends for his stockholders, but this time has passed. The past 10 or 15 years have witnessed a marked change in the attitude of the public toward gas companies, and, as an inevitable result, a remarkable change in the attitude of gas companies towards the public. While formerly the public were willing to pay a high price for gas and accept indifferent service without much complaint, its attitude at present is to insist upon a low price for gas of good quality and the best of service.

This change is but the natural outgrowth of the gradual increase in gas consumption and gas consumers. When gas was a luxury, and the number of consumers comparatively few, the large majority of the people were not interested either in the price and quality of the gas or in the quality of the service. Gas was then used almost exclusively for illuminating, and was not nearly as important a factor in the business and domestic life of the nation as it is to-day. What dissatisfaction there was among gas consumers found little public outlet or agitation.

As the number of consumers increased and the gas began to be used for domestic and industrial purposes, the clamor for lower prices, good service and good gas increased, until the agitation became strong enough to induce gas companies to lower their prices and better their service. This caused a rapid increase in the number of consumers and a corresponding increase of public agitation for still lower prices. The managers who had depended mainly upon high prices to earn dividends were now compelled to economize in every way in order to compensate for the reduction in price by a reduction in operating expenses per 1,000 feet sold. The cost of producing gas admitting of but little more reduction, there remained but one way to meet the decrease in revenues caused by reduced prices; viz.: A greatly increased output. Increased output meant lower cost of production and increased net earnings, net earnings depending upon two factors; viz.: Profit per unit sold and the number of units sold.

The comparatively recent and wonderful increase in gas consumption dates from the time when the gas fraternity realized this fact, and it was this that caused the remarkable change in the attitude of the gas companies towards the public.

While heretofore gas companies had been satisfied with the business that came to them and allowed the public to solicit them to supply gas, they now commenced to solicit business from the public and adopted every means at their command to increase their gas sales, not only for illuminating but also for domestic and industrial purposes.

While heretofore gas companies paid but desultory attention to the complaints and needs of their consumers, and in many cases treated them with scant courtesy, they now organized efficient trouble departments, and to-day there is no business, public or private, that looks so carefully after the interests and troubles of its consumers or treats its customers with so much courtesy as the modern, up-to-date gas company.

The gas fraternity has, indeed, reason to be proud of its record. While nearly all products have during the last 10 or 12 years greatly advanced in cost, the price of gas has been gradually lowered, notwithstanding the fact that the cost of labor, coal and all material used in the operation and construction of our business has greatly increased. It is only by the utmost economy and system and vigilant attention to every detail of operation and construction, in connection with the most progressive and persistent efforts to increase the sale of gas, that the gas industry has been able to meet the demand for cheaper gas in the face of greatly increased cost of labor and material.

While other public utilities, for instance, the street railway companies, are maintaining the prices in effect 10 to 20 years ago, the price of gas has been reduced from 30 to 50 per cent. during the same period. That the reductions have, in nearly every case, been made voluntarily reflects great credit on our fraternity, and is a strong indication of the progressive spirit pervading and animating our business, which has made our product, which was but yesterday the luxury of the rich and out of the reach of the masses, the necessity of to-day, and placed it within the reach of everyone.

In many ways and in individual cases, especially in small towns, the demands of the public have been unreasonable and worked injustice and hardship, but this has usually been through ignorance, the public not realizing that a fair price for gas can only be determined by taking into consideration many factors, such as local conditions of operation, investment, construction, price of material and labor, population, and many other items. In a large city a gas company will often sell more gas on one block of main than a company in a small town will sell on 5 or 10 miles. Not only does the public often make unreasonable demands in regard to prices for gas by neglecting to consider the above factors, but our present method of taxation works hardship and injustice from the same cause. But, in the main, the public and the gas companies have both been benefited; the public in greatly reduced prices, the gas companies in vastly increased sales, resulting in lower cost of production and corresponding increased earnings.

The point I desire to emphasize by this brief review, before I outline in a general way the necessity of system in our business, is that the manager of to-day must depend, for the success of his company, not upon a high price for his product, but upon a low cost of production, and, above all, upon a large output, large sales per meter, and per mile of main, excellent service, and the goodwill of the public. Briefly, then, the manager has the following results to work for, and in order to obtain these results he must concentrate his effort upon effectiag a system which will produce these results with the least possible expenditure of time, money and labor.

(1), Low cost of production; (2), large output; (3), large sales per meter; (4), large sales per mile of main; (5), large sales per capita. Final results: Increased earnings and satisfied investors; (6), good quality of gas in sufficient quantity at a fair price; (7), good pressure at points of consumption; (8), courteous treatment of the public by the company at all time; (9), careful and prompt attention to all complaints and trouble; (10), careful consideration of the interests of the city and the public. Final results: Satisfied customers and the goodwill of the public.

In the above enumeration the final results are the end to be obtained, the items 1 to 10 are merely means to obtain these ends. In the management of gas companies this distinction must always be borne in mind. To strive for the first end is the manager's duty towards his stockholders; the attainment of the second end is his duty towards the public.

During the last few years the writer has had occasion to inspect and investigate a number of companies, none of which were producing satisfactory results, and in most cases this was due entirely to lack of system in the management.

Many of the companies here represented are managed under very efficient systems, and the fact that these companies are producing the best results proves the value of system.

It is an efficient system in management that has placed the Company which is to-day our host in the proud position it occupies in the gas world, and the writer feels very grateful that he was so fortunate as to serve his apprenticeship under its progressive management.

To closely trace in detail the application of system in all the departments, is too much for the scope of one paper; so I will attempt to show, in a general way only, the value of systematic management of our business. If the subject proves sufficiently interesting to our members, I would recommend that, for our future meetings, papers be secured if possible on the application of a good system in the various departments of the gas business. Each paper should be prepared by a man who is obtaining the most efficient results in his department.

System means a place for everything and everything in its place; a time for everything and everything done in time; a best way of doing everything, and everything done that way.

As in physical culture, the aim is to develop all of the muscles in perfect proportion and harmony, so the manager's object should be to so systemize the different departments of his company that each department will show the highest possible efficiency, and all work in perfect harmony and accord. The head of each department should be a specialist in his line, but the manager should be in close touch with, and posted on, all the departments, devoting his energies to getting the most efficient results in every branch of his company. A manager who concentrates his energy upon one or more departments, to the neglect of others, is very apt to lose in one place what he gains in another. He may obtain low cost of production, a large output, or both, and lose the goodwill of the public, one of the most, if not the most valuable asset of a gas company.

A company may operate without any system, or under an indifferent one, and by sheer luck obtain fair results; but one may rest assured that such a company would show infinitely better results under a good system. Good luck is a very unstable and unsound foundation to depend on, and no manager should be satisfied with obtaining good results unless he knows how, why and where they are obtained. It is not sufficient to know that you are sick. It is necessary to know the nature and location of your disorder, to enable the application of the proper remedy.

As it is impossible for the manager to watch every detail of the business all the time, it is necessary that he have a reliable and efficient force of employees, and a comprehensive, detailed system of reports of every department, both daily and monthly. With his personal supervision and a good system of daily accounting and reports the manager will have no trouble in detecting laxity or inefficiency in any department of his company, or in any of his employees. Without system, such laxity or inefficiency will be manifest only in the final results, with nothing to indicate where the trouble exists. The knowledge that a chain is no stronger than its weakest link is but poor consolation, unless you know which link is the weakest. A gas company is no stronger than its weakest department; and a good system will keep the manager posted as to the relative strength and efficiency of each department.

The rule for the manager and heads of departments should be to pay good wages and salaries for reliable, faithful and efficient employees. A poor, unreliable employee is dear at any price, and the quicker he leaves the employ of the company the better. Even if the manager is personally charitably inclined, under present keen competition of business life he cannot afford to make his company a reformatory or

to endanger the success of his company by employing incapable and inefficient help, no matter how little they will work for.

Under a good system the management must be always posted as to the efficiency and faithfulness of the heads of his departments, and they in turn must be informed as to the merits of the employees of their respective departments. This will enable him to retain and advance efficient employees and get rid of inefficient ones. By an efficient employee I mean one who not only performs ably and faithfully his line of work, but one who works for the interests of his company as though they were his own. He should also work in harmony and be in sympathy with the policies and methods of his employer.

Under a good system the manager will not only receive detailed and accurate reports of his various departments, but will also compare the results obtained with the reports of preceding years. Not content with this, he should, if possible, compare them with results being obtained by other companies which are operating under corresponding conditions and are showing excellent results. This will enable him to detect weak points which he might not otherwise discover. When a manager is obtaining excellent results he should not feel satisfied, but should devote his energies to retaining these results in the future and obtaining still better results, if possible. A company cannot remain stationary for a long period of time. There must be progress or retrogression is bound to set in. It is part of a good system to impress all employees with the fact that the interests of his company and the interests of its consumers are identical, and that, therefore, all complaints and trouble reported must be received in a perfectly courteous manner and attended to promptly. Nor must any complaint, whether it be in regard to poor service or about a gas bill, be dismissed until the trouble has been remedied, or every effort has been exhausted to adjust the complaint to the satisfaction of the customer.

The manager should keep in close touch with the trouble department, and no effort or cost should be spared to remedy the troubles of our consumer to prevent their recurrence, but above all, to prevent their occurrence. Time and money spent in keeping present customers satisfied are even a better investment than time and money spent in obtaining new consumers. In deciding upon extensions of the mains, a good system requires that the decision be made, not merely from the standpoint of the interest of the company, but that due consideration be given to the interests of the public. An extension may not promise an immediate profit in dollars and cents from the consumers in sight, and yet conditions may be such that it is advisable and expedient to make the extension. The manager should be able to make an intelligent decision in such cases. In fact, in formulating and carrying into effect any policy affecting the consumers or the public, their interests should be given due consideration.

To obtain a low cost of production, it is necessary that the utmost economy be used in all departments, both in labor and material. The small economies are more important than the large ones, because the small leaks are not so easily detected. Also, if you train your em ployees not to waste anything, not even scrap-paper, the practice of economy will soon become second nature to them. Few people realize the power that number bestows on things in themselves insignificant. Yet the large traction companies, with investments and expenses running in the millions, make their expenses and earning solely from nickels. Train your employees systematically in the practice of economy in every particular.

At the works system must be employed in the operation, repairing and construction of the apparatus, nor should the manager be satisfied until each piece of apparatus is performing its function in the most efficient and economical manner. Construction work should be done in time to have the manufacturing and distribution system keep pace with the increasing business, so as not to run any chances of poor service, due to lack of capacity, which will also cause expensive operating. Complete and detailed reports should be rendered the manager each day and every month, giving all the essential information about each department. All material used from stocks, either in construction or operation, must be accurately reported, and no guesswork should be allowed, but all material used must be weighed, measured or counted.

In determining the earnings and expenses for the month, the manager must be sure that all items of expenses and earnings properly belonging in said month are included in the figures, and that all bills have been charged to the proper account. This is very important, for unless this is done the statement will show the earnings either larger or smaller than they really are. Be honest with yourselves and your stockholders.

System in the distribution department means that all pipes are laid in the proper way and are of ample size; that the interests of the city and the public are properly looked after in necessary excavations; that meters are of proper size, and that a good pressure and supply is maintained at the point of consumption. All drips must be pumped at stated intervals, and the utmost measures taken at all times to prevent stoppages of pipes or poor or interrupted service from any cause.

System in the office means that all records and accounts are kept in proper shape and kept up-to-date. All orders finished during the day should be returned to the office the next morning and immediately posted in the proper books of record and accounting. Meters should be read as near as possible the same dates each month and bills delivered to consumers. The force of employees must be sufficient and competent to discharge their various duties. Office, salesroom and stock room must be kept scrupulously clean and in perfect order. All persons entering the office must be promptly and courteously waited upon, whether their object is to buy a gas range, pay a bill or kick about the amount thereof.

All the different appliances and burners must be kept so as to exhibit their advantages in the best possible manner, and connected up in order to demonstrate their operation. The offices and salesrooms should be arranged for the convenience of the customers, and should be a credit to the city in which the company operates.

Invoices for appliances, tar, coke, etc., should be rendered promptly and statements made out the first of each month of every account receivable on the books of the company. These statements must be kept in the hands of the collector or in the office file until paid, and not be destroyed or left with the customer under any circumstances. On the back of each statement the collector should enter the date of each call and the result of same. With a good system of collecting a manager will not feel the need of substituting prepayment meters for his collectors, except in case of transients, or exceptionally hard cases.

In the new business department system demands that a card index be kept of each house in the line of the mains, showing all the necessary data, so that the representative can arrange his visits intelligently and talk the proper appliances.

Every month a list should be made out of dead services and of consumers using small amounts of gas or not any, so that the energy of the representatives can be concentrated on this class of prospective business. Nor should the efforts of the company be limited to obtaining new consumers or increasing the sales of gas to present consumers. Just as much energy should be employed to look after the wants and troubles of present consumers, to see that their appliances and burners are kept in proper condition, and to see that the customers get the best results out of the appliances already installed.

System should be used in the advertising, so that only that class of advertising is used that will produce the best results with the least expenditure of time and money, taking into consideration local conditions.

The best advertisers for a gas company are an excellent service, prompt attention to all orders and courteous, considerate treatment of everybody. These will result not only in increased sales but also in the goodwill of the public, thus adding to the value of two of the most valuable assets of a company.

Add to this attractive newspaper advertising throughout the whole year, and especially persistent personal solicitation by capable, gentlemanly representatives. A good, efficient body of representatives will bring in more business and result in more benefit to the company than all other forms of advertising combined, except excellent service. But to obtain efficient results in the new business department it is just as necessary to employ system as it is in the manufacturing and distribution departments. The representatives should follow up every prospective consumer systematically, making a house-to-house and floor-to-floor canvass in their territory as often as possible. They should have enthusiasm for their business and enthusiasm for the company employing them. They should always remember that they are the gas company to the persons they call on, and must never forget that their mission is threefold:

1. To increase the sales of gas.
2. To adjust or report to the office for the investigation of all complaints and troubles.
3. To cultivate a kindly spirit among the public towards the gas company.

Perhaps none of us can attain the ideal system I have set forth, nor have I given it as an existing, perfect reality, but it is worth much to have an ideal. The ideal of the past is the reality of the present, and we may hope that our ideals of the present will be realized in the future. Ideals cease to be such when they are realized. Our ideals travel as fast as we do, but in pursuing them we surely make progress, and progress must ever be the watchword of the gas industry, for it is progress that has made gas one of the most necessary factors of present civilization.

Gas Distribution at Grand Rapids.

[A paper read by MR. A. F. TRAVER, Grand Rapids, at the Grand Rapids meeting, Michigan Gas Association]

During the fall and winter of 1902, Grand Rapids began to have her first serious troubles on the distribution system then in use. During the summer just preceding this there had been installed several miles of large feeder mains radiating from the works. These lines were put in with the view to putting an end to pressure troubles for many years to come, but owing to the rapidly increasing business and the still more rapid increase in peak load due thereto, these mains proved inadequate to supply the required amount of gas at the peak hours unless they had behind them the highest holder pressure possible with our present holder installation.

This condition reduced our available holder capacity to the 300,000 feet of gas contained in the upper lift of our heaviest holder, and as this amount, supplemented by the maximum make of our generating apparatus during the peak hours, could not supply the demand, the holder uncupped several times during the winter before the draw was off, resulting in a decreased pressure on the distribution system. To remedy this we installed the next summer a small gas driven exhauster at the outlet of one of our smaller holders, so connected as to pump from this holder directly into the street mains, thus rendering some of the gas in this holder available for use during the peak hours, the amount thus available being dependable on the maximum pumping capacity of the exhauster during the hours it was run. The method of operation was to start the exhauster at the beginning of the heavy pulls, supplying as much gas as possible from this small holder, thus keeping the greatest amount of gas possible in the upper section of the large holder. The maximum capacity of this exhauster, however, was just about equal to the increase in consumption during the peak hours, and we again had the unpleasant experience of seeing our large holder uncup before the end of the heavy draw.

The following summer this small exhauster was replaced by a turbine blower set of sufficient capacity to empty the two small holders to which it was connected during the hours of the peak load. This installation would have taken care of the situation nicely when working in conjunction with the upper lift of our large holder, but we had no sooner put this rig in operation than we found it necessary to increase our street main pressure above that thrown by the heaviest holder, owing to the extraordinarily large percentage increase in our peak load. The blower set, while larger than necessary for the purpose for which it was bought, was entirely too small to pump all the gas used during the peak hours, which was required under the new conditions. The installation of larger apparatus in the short time given was out of the question, as it was impossible to get deliveries at that time, so an old No. 5 Sturtevant blower and engine, formerly used for blasting a small water gas set, was pressed into service. There was no time for good foundations, so this outfit was rigged up on timbers placed on the lawn near the turbine set. The air openings of the blower were patched up with galvanized iron plates. A galvanized iron pipe was fitted up as an inlet, the whole outfit, piped up with galvanized pipe, was cut into the line in parallel with the turbine blower, and the whole rig started the evening after the first heavy draw came on. This rig, in conjunction with the turbine set, gave us a sufficient supply of gas for about 2 weeks, but as the evenings grew longer the combined output of the two sets was insufficient, and it became necessary (there being no other blowers available) to close all holder inlets and put the make of gas on to the street direct from the station meters. In this crippled condition we managed to pull through the winter without further pressure troubles, and with only one accident. This occurred during the dead of winter, and at the time of our heaviest daw. All of the apparatus used for putting gas on to the street was run by steam, and one evening, just at the time of our heaviest draw, one of the tubes on a boiler let loose, and for a time we were without a pound of steam on the works. Fortunately, we were able to get holder pressure onto the street before the street pressure dropped to the danger line. This, as before stated, was the only accident to this outfit, and in view of the poor apparatus and the lack of duplicates the performance was quite remarkable.

During the summer of 1905 we installed two gas engines and blower sets, each consisting of a 50-horse power Olds gas engine and a special No. 10 Sturtevant gas blower, belted together through a countershaft. Each of these sets had at the time of installation capacity and pressure enough to take care of our requirements for 2 years, and took the rnn through last winter without a single accident. This installation as it now stands is far from being all that can be desired, due solely to the use of belts, and we are now installing a positive blower, directly connected to a gas engine, in order to get a line on the respective merits of the two types.

It is not within the province of this paper to enter into a lengthy discussion of the advantages or disadvantages of the different systems of gas distribution, but it will try to put before the Association in a brief way the system which is believed to be the best system for Grand Rapids, and which will work out best for nearly all cities. Briefly, this consists in utilizing the present mains both as feeders and distributers, increasing the pressure on these lines as may be required up to the safe pressure of the pipe, provided this pressure is within the economic limit. This point is reached when the cost of pumping, plus the interest, depreciation and repairs on the pumping plant and service governors, plus the cost due to increased leakage, is above the interest charge on larger mains to produce the same result, and it is simply a question of figures as to which method may prove the more profitable.

This is almost universally conceded to be the most economical of all distribution systems, and also the most satisfactory, provided it were possible to get perfectly reliable pumping machinery and a really good service governor. It also furnishes a means of keeping the distribution system balanced with the least expenditure of money, as it is almost always possible to meet unexpected pulls from different sections of the city by small main extensions, whereas in laying out a booster system it is impossible to forecast the future pull from all sections of the city, and should an unexpected draw come from any one it often necessitates an expensive addition to the booster main. Conversely, should the draw from a certain district fall off, due to some local condition, the loss would be much less with this system, due to the smaller investment in street mains.

The most ideal and economical method of pumping the gas is undoubtedly the fan system, put in on the following basis: At the time of the first installation two fans are installed, each having a capacity somewhat greater than the maximum instantaneous demand and throwing a pressure in excess of the maximum pressure required on the street mains at this time. This gives two sets of pumping machinery, each capable of supplying the demand, one being used on the street, the other being kept in reserve for use in case of accident to the first. When the consumption increases beyond the capacity of one fan, a third set is installed, two being operated and one kept in reserve; when the consumption increases beyond the capacity of two sets, a fourth set is installed, three being operated and one kept in reserve, and so on, as more capacity is required. If during this time, when the initial pressure on the street mains is the maximum the fans will throw, and the pressure in the outlying districts in general becomes too low, it will be necessary either to increase the size of the street mains to care for this condition or to resort to stage pumping by installing more fans in series with the first sets, just which method will be more economical being found by comparing the interest on the larger mains with the interest on the extra fan equipment, plus the cost of operating, plus the increased leakage. In case the low pressure is not general in the outlying districts, it will usually be possible to care for the local low pressure areas cheaply by increasing the size of short stretches of main at points where it will do the most good, as shown by careful pressure surveys.

Direct-connected electric motors are undoubtedly the best form of power for driving the fans. Steam turbines, direct-connected, are used to some extent, but as these sets are only made in small sizes they are not available for the larger plants, and, judging from our experience at Grand Rapids, the very high maintenance cost prohibits the use of the smaller size; the fans may also be belt-driven, power being furnished by either steam or gas engines. The use of belts on fans throwing the higher pressures, however, is not very satisfactory, as with the present designs of fans for blowing gas the fan-speed required for furnishing these higher pressures requires a dangerously high belt-speed. The fan belts on the Grand Rapids installation have a speed of over 8,000 feet per minute when tho fans are throwing their full pressure, a condition which is not at all pleasant and which requires the most careful watching. In view of the accident to our steam plant, with its unpleasant after effects, gas engine power was decided upon for our fans, based mainly on the theory that so long as we have gas to pump we will have gas to pump with, and would thus be independent of any accidents to our steam plant. This installation has been very satisfactory, with the exception of the belting, and pumped all of our gas during the peak hours of last winter without a single mishap.

The use of direct-connected positive blowers for the purpose of pumping gas requires at the outset the determination of the maximum pressure to be carried on the street mains and the installation of enough

power at the beginning to drive the blower against this ultimate pressure. This results in an increased investment before it is needed, and also a slightly increased operating cost, thus rendering it less economical than the fan system, although as compared with belt-driven fans of the present design it is probably the more satisfactory system of the two. Future additions to this system are, of course, on a basis of capacity only, the pressure being cared for at the start.

The use of this system of distribution naturally calls for a service governor on every service where the pressure rises to any great extent, and the success of the system from an economical or practical standpoint must necessarily depend on the installation of a thoroughly reliable and cheap regulator. Good governors for high pressure gas have been on the market for some time, but these are not adapted for use on a low pressure system, owing to the entirely different conditions under which they are to operate. In high pressure work the drop in pressure through the governor is of small importance, as there is always an excess of pressure at the inlet, whereas in the high, low pressure work we require a governor which will not only properly reduce the street pressure when this rises above that for which the governor is set, but also one with a valve opening sufficiently large to pass, with a minimum drop through the governor, an amount of gas equal to the capacity of the meter to which it is attached when the street pressure drops to a minimum. We also require a governor which will give us practically no trouble from naphthaline or water, a condition which the high pressure governor does not have to meet.

The problem of designing a governor to meet the conditions of this service, however, presents no serious difficulties which cannot be overcome, the main trouble being to provide a governor which will fulfill the conditions, and at the same time be comparatively inexpensive. At the time this system was first decided upon we began looking for a governor which would meet our requirements, but not being able to find such on the market we set about designing a governor for these conditions. By working in conjunction with a couple of regulator manufacturers we succeeded in evolving two separate types of regulators, which we think will stand up under the service required and are comparatively inexpensive. These are both diaphragm governors, mercury governors being unsuited for the future demands of the system unless fitted with very deep mercury wells, which involve the use of a considerable quantity of mercury in each regulator, besides being more dangerous should the mercury be spilled or blown out during the high pressure hours. Again, mercury governors to work properly should be set perfectly level, while diaphragm governors may be set or knocked considerably out of plumb without interfering to any extent with their proper working.

One of these types is a tin case regulator with an extra large valve opening and a single large diaphragm to furnish the necessary power to close the valve against the high inlet pressure. This type has the regular meter stubs for inlet and outlet connections, thus rendering it very easy to connect the line, a very important item in the cost of installation. The other form has a cast iron case and extra large valve opening, the valve itself being balanced by a small secondary diaphragm, and a large diaphragm controlling the house pressure. This governor is designed for connection into the line before the meter, and has standard pipe-thread connections.

Of the tin case type we have only made up the 5-light size, as the number of large meters in the district to be covered this year is quite small, and we did not care to go to the expense of getting out dies, gigs, etc., for so small a number until the superiority of this type had been clearly demonstrated.

Each of these two types of regulators has its points of superiority, and we are dividing up our requirements for this year's work between the two, with the view to finding out just which is more satisfactory under service conditions, but we are satisfied that either of the two types is far ahead of anything else on the market for this purpose.

The 5-light sizes of these governors will pass 120 feet of gas per hour with less than a 2-tenths drop through the governor, at an inlet pressure of 30-tenths, and will hold a 35-tenths delivery pressure with a 600-tenths inlet pressure without "creeping," and the diaphgrams have been tested to 20 pounds without showing signs of distress. The valves and valve seats are so designed that accumulations of naphthaline or other foreign matter should give very little trouble. From the above it is apparent that these little governors can easily handle the capacity of the present 10-light meters, although in view of the increasing use of special large capacity meters it might not be policy to install these governors on larger than 5-light meters.

In view of the comparatively low pressure under which these governors will operate it was at first thought unnecessary to vent them to the open air on account of the slight danger of the diaphragms bursting. The first few governors were, therefore, installed without vent pipes, the governors venting through a small hole in the case directly into the basement. It was soon found, however, that in some cases the diaphragm oils absorbed odors from the gas and imparted them to the air in the case above the diaphragm, and as the air was expelled into the basement as the diaphragm worked it soon caused a disagreeable odor in the immediate vicinity of the governor. The diaphragms were soaked in different oils and solutions in an effort to remedy this but without success, and we were obliged to run small lead vent pipes from each governor to the open air.

At the present time the Grand Rapids Company has installed about 7,000 of these regulators on the services of its consumers, and they are all working very satisfactorily, giving each consumer very nearly perfect service.

Along with the increasing use of gas for many purposes comes the demand for more perfect regulation than we are now able to give with any distribution system without the use of service governors. While most of our present gas appliances work fairly efficiently under variations in pressure, provided the maximum and minimum limits are not too widely separated, still there is no question but that the nearer these limits are together the more perfect service we will give, and it is only a question of time when we will be compelled in our own interests to narrow the limits in pressure variation to a minimum. Then, again, municipalities throughout the country are already clamoring for better pressure conditions on the consumers' premises, as can be noted in the pressure clauses of the gas ordinances being passed in several sections of the country. So far as I know, the Grand Rapids ordinance recently passed, the pressure clause of which limits pressures to between 18 and 45-tenths, is the only pressure limiting ordinance in effect in this State. In view of these facts, we believe that a few more years will see much better pressure conditions throughout the various cities of the country, the best results being obtained by the installation of a perfect service governor on every service in the city.

We do not claim that the Grand Rapids governors are perfect or nearly so, there being many points in which they may be improved, but we do claim that they are far ahead of anything else which has been brought out up to the present time for this purpose, taking into consideration capacity, efficient operation, first cost and ease of installation. It is altogether probable that the experiences of a couple of years with an installation as large as this at Grand Rapids, together with an increasing demand for this form of apparatus, will tend to bring out still better and cheaper forms, which will ultimately lead to our several companies giving perfect service to our consumers, as far as gas pressure is concerned.

Street Lighting in Edinburgh, Scotland, of the Inverted Burner Type.

The *Gas World* notes that for a good many years now the public lighting of Edinburgh has been of a somew hat mixed character, and, at the same time, not such as the city had an y great reason to be proud. There have been electric arc lamps, incandescent gas lamps, and flat flame gas lamps; the last mentioned, with their consumption of 2 cubic feet of gas per hour, not particularly remarkable for their illuminating efficiency, despite the high quality of the Edinburgh gas supply. Durthe past 2 years there has been a good deal of discussion in the Town Council and elsewhere as to how the lighting of the city could be improved, and during all these discussions the question of cost has been kept in the foreground. The powers that be have been so long accustomed to an annual lighting bill based on lamps consuming 2 cubic feet of gas per hour that they could not be brought to face any material increase upon this rate of consumption. After considerable study, experiment and inquiry, conducted by the lighting inspector. Mr. G. A. D. Mackay, and Mr. W. R. Herring, the gas engineer, the latter of whom is officially interested only as engineer to the Edinburgh and Leith Gas Commissioners, who supply gas to the respective Corporations, the Edinburgh Town Council finally decided that all the existing flat flame burners—some 10,000 in number—should be displaced by inverted incandescent gas burners. But, though Mr. Herring is officially interested only in the way indicated, he has devoted a great deal of attention to the subject, and it is to his efforts and those of Mr. Mackay that the departure now to be taken may be mainly attributed.

Having satisfied themselves that the inverted burner was the best for their purposes, the Edinburgh authorities next set about selecting a particular burner of this type, and their choice fell upon the "Star" burner of the Star Inverted Incandescent Burner Company, Limited, who are supplying their No. 2 burner fitted with a carefully drilled

nipple designed to average out at a consumption of about 2¼ cubic feet per hour, calculated on the varying consumptions under the varying town pressures over 24 hours. The work of conversion to the inverted system is being proceeded with, and before winter is in evidence the streets of the city should be lighted on the new system.

The lantern to be employed in the new scheme of lighting is as illustrated. It is the special design aud manufacture of Messrs. R. Laidlaw

and Son, Limited, Edinburgh. The lantern is of copper, with enameled earthenware reflector and cone. A special lighting arrangement is introduced. The lamplighter turns the tap half on, and with his torch lights the flash jet, which, in turn, lights the gas at the burner. When he withdraws his torch, he again touches the lever, turning the gas supply off from the flash jet and full on to the burner. Messrs. Laidlaw have already made 6,000 of these lanterns, and they have on order 4,000 more, which will complete the number required for the city.

The Disposal of Ammonia, Tar and Gas from By-Product Coke Ovens.

Mr. C. G. Atwater, having mentioned the fact that his attention had been called to a review in the June issue of the *Journal* of the Society of Chemical Industry, of a book entitled "A Short Treatise on the Destructive Distillation of Bituminous Coal," goes on to say that the reviewer drew some conclusions as to the disposal of coke oven by-products that hardly seem justified when the rapid development of these markets is considered as well as their present status. Mr. Atwater then remarks:

The review questions whether the addition of a plant carbonizing 1,000 tons of coal daily, to the present by-product oven installation, producing approximately 3¼ million gallons of tar and 3,500 net tons of ammonium sulphate per year, would not so depress the by-product market as to "deprive that type of construction not only in the new plants, but also in those previously erected, of the greater part, if not all of the advantages resulting from its output of by-products."

The market for ammonia in all forms, including sulphate, has undergone an increase from 18,000 net tons of sulphate equivalent produced in 1899, to 54,664 net tons in 1904, or, roundly, 200 per cent. increase in 5 years. The average price has consistently risen during this addition and has shown to date no tendency to recede. As the imports of sulphate were 6,976 net tons in 1899, and 15,288 net tons in 1905, any apprehension as to a catastrophe in this particular industrial field by the addition of 3,500 tons to the home production may well be laid aside until needed. Such an installation as cited requires a year for its completion, which is ample notice for the market to adjust itself to requirements. To one who appreciates the vast field open to ammonium sulphate as a fertilizer, and who is aware that the United States, the greatest agricultural country in the world, now uses but one-third of the nitrogen used as a fertilizer in Germany, per unit of population, including the large nitrate of soda imports in both countries, such apprehensions seem idle.

The market for tar, it is true, furnishes more reasonable ground for conservatism. The tar from the 3,000 odd by-product coke ovens now in existence in this country has practically all come on the market within the last 10 years, there having been but 72 by-product ovens in 1895, according to Dr. Parker's report. The total production of coal tar from gas works and by-product ovens was 69,498,085 gallons in 1904, according to the same authority. Of this, 41,726,970 gallons or 60 per cent. was produced in the gas works, the balance, 27,771,115 gallons or 40 per cent. being produced in the by-product coke ovens; therefore, the addition of the by-product coke oven tar to the existing gas works production represents at least 66 per cent. increase, besides that due to the extension of the gas production itself. As the Geological Survey reports above referred to were not issued as early as 1895, we have no accurate data on this point, but the report by Dr. Wm. B. Phillips in 1898 gives the production of tar in gas works for that year as 24,384,798 gallons. The amount in 1895 was assuredly less than this. Contrasting this figure, however, with the present production we see that an increase has taken place approximately 200 per cent. up to and including 1904, and including 1905, it will approximate 250 per cent. increase. Under these conditions the value of the tar, quoted in 1898 at 3.7 cents per gallon by the above authority, has fallen to 3.04 cents in 1904. This is a loss, to be sure, but it is by no means a serious one. It must be remembered that the first resort for the tar producers in a low market is to burn it as a fuel, for steam raising, etc., for which purpose it is equivalent to coal at a ratio of 5 pounds of tar for 8 pounds of coal. Therefore, where coal is worth $3.75 per net ton, tar can be burned with equal economy at a cost of 3 cents per gallon, or where coal costs $3.12, tar is worth 2.5 cents per gallon.

Even under the tremendous expansion that the coal tar manufacturing industry has undergone, prices in this country have never averaged as low as those prevailing in England and Germany. Nevertheless in these countries the by-product oven system is constantly gaining ground, and in Germany in particular is now far in the lead. A far greater proportion of the United States tar production goes into the manufacture of prepared roofing and for waterproofing than is the case in either of these other countries. A great and immediate increase in the tar production might conceivably so far modify these conditions as to cause American prices to approach the English figures, but this would detract but little from the economic advantages of the by-product coke oven process.

It is therefore clear that, for both ammonia and tar, the market conditions are far from supporting any apprehension as to their immediate future. Both have shown a remarkable capacity for extension without resort to the less remunerative avenues of disposal, and the demand for both seems to be constantly on the increase.

As regards disposal of gas, it is said that the market for fuel and illuminating gas is now fully supplied. But the source of this supply is based on the constant consumption of coal or petroleum oil, barring the cases where natural gas is used. Therefore the question of supply rests on a constant outlay for raw materials. If a supply of completely or partially manufactured gas of higher quality can be offered to the gas companies at the same cost, or an equally good quality at a lower net cost than the existing method of raw material supply and manufacture comes to, they will inevitably turn to the new and more economical source. It is merely a matter of dollars and cents. And that these arguments are worthy of consideration and that such conditions can and do prevail, is attested to by the fact that a considerable number of American cities are now successfully using the gas from by-product coke ovens for all or a large part of their illuminating and fuel requirements. The fact that in nearly every case a continual increase in the gas consumption has made frequent extensions of the gas making plant necessary, and that the lowering of the price of gas extends its use enormously, must also be given due consideration. There are few American cities that do not anticipate larger gas plants, lower gas prices and greater consumption in the near future.

For these reasons it does not appear to the writer that the immediate extension of the by-product coke oven industry will be fraught with disaster to the by-product markets. In the light of what has gone before, the future does not seem otherwise than most promising.

An Involute Wrench.

The illustration shows a wrench, known as the "No. 1 Involute," which is being put on the market by the Tower-Lyon Company, of New York. It is a solid steel forging, 5½ inches long over all, as at present ready for delivery, but the Company is preparing to manufacture the device in other and larger sizes. The size here mentioned has a nut capacity, outside measurements, in square, hexagon and other

shapes, of ¼ to ½-inch. The name of the wrench is derived from the nature of the curve of the jaws and the angle of the teeth to the fulcrum, these being tangent to the jaw. The wrench, which is all polished, weighs only 3 ounces. As a result of this form of construction the strain is forced to the fulcrum, in putting on or removing nuts or turning rods, pipe or other material of circular shape. The end of the handle is finished to form a screwdriver blade.

The Timber Creosoting Plant at Shirley, Ind.

[A paper read by MR. H. H. KNOWLTON, Cincinnati, O., at a meeting of the Indiana Engineering Society.]

The (creosoting) plant at Shirley, Ind., is owned by the Columbia Creosoting Company, of which L. T. Dickerson is President, and C. B. Lowry is Manager. The Rueping process is employed, which consists in the injection of creosote oil under pressure into seasoned timber to a certain amount per cubic foot of timber, and the removal by vacuum of surplus oil.

Before these ties are treated they must be thoroughly seasoned, as ties with sap or water in them are not penetrated to any depth by the oil. Many plants are built to thoroughly steam the timber and to pump the sap out of it, this process taking place in the same cylinders as the injection of the oil and immediately preceding it. Others resort to a kiln to drive all moisture of any character away. This plant has no provision for either of these. The particular point is made by the company that steaming timber reduces its strength by from 10 per cent. to 40 per cent.; that it encourages splitting and warping; that it does not remove all sap and water, and for these reasons its process is much superior.

The general plan of the plant is a seasoning yard at the north end of the retort house, with two railway tracks 93 feet c. to c., running its full length, about 1,500 feet. South of the retort house four electric tracks run between the other two tracks, which are extended past the retort house and on each side of a tie dock or platform. The two electric tracks on the outside are for placing buggies to be loaded and unloaded, and the two inside tracks are for the purpose of storage of loads and shifting. South of the retort house is the tie dock, with timber sides and filled with earth to the height of a car floor, and there is room for 10 railway cars on each side of it. Seasoned ties when shipped in are unloaded directly from the cars on to the buggies, and treated ties are unloaded directly from buggies on to railway cars. Five cars inbound and 5 cars outbound are handled at one time on each side, and as buggies are unloaded of treated ties they are run up to cars with inbound ties on them, and are loaded for treatment. The buggies have roller bearings and are easily shifted by hand even when loaded.

The yard for the storage and seasoniug of ties has about 7 acres of available ground, which allows room for the storage of 500,000 ties, space being reserved for loading and unloading tracks and for the men to handle ties. The ties are piled in a systematic manner, and to best advantage to season thoroughly. Also the ties of same kind of wood and age after cutting are piled together and so that all ties treated in one run are as nearly as possible seasoned to the same degree and are of the same kind of wood, or of woods of about same density. In order to assist in seasoning, a standard method of piling is adopted, which is to lay two creosoted ties on the ground, on top of which eight green ties are piled with uniform spacing between them, the outside two being placed on edge and the others flat. In the next tier are placed two ties only, and then eight as before, continuing until the pile is 12 to 16 feet high. Another method of piling, with greater economy of room, is to place a tie at one end only on alternate tiers, which makes the solid rows sloping. By both methods air can circulate freely and ties can thoroughly season in the least possible time. Each pile of ties is marked to show age, when cut, where from, and whether grown on high or low ground, all of which information is of utmost importance to secure proper treatment.

From 8 months to 1 year is required to thoroughly season ties (with dense oaks 2 years would be better) and render them fit for treatment, and here appears the most serious objection to this process, and that is the tying up of a large amount of money for a year. In case the number of ties for treatment was 350,000 the railway would have not less than $100,000 invested in ties all assembled at one place and menaced by fire.

When properly seasoned the ties are loaded on buggies made entirely of metal and run directly into the retort. These buggies operate on a track of 30-inch gauge, with 52-inch rails, and are shifted in trains by means of an electric motor car, which weighs about 6 tons and which depends upon a conductor rack laid between the rails for its tractive power. The maximum drawbar pull is 850 pounds. It has two speeds, 85 feet per minute and 350 feet per minute, change being made in the gears. This rack is about 2 inches above top of rails, and is secured to the ties by spikes, insulation being interposed. It is protected along the sides by wood strips, which extend ¾ inch above the rack. This seems to provide ample insulation against accidents of any nature. At switches the rack broadens to triangular form, to which the movable section of the rack is attached for each of the different routes as required. Bonding through movable sections is secured by the usual means.

There are 15 buggies handled in each train, this being the exact number contained by the retorts. These buggies are 4 feet long and ties are piled longitudinally on them, care being taken to have them open piled to insure thorough treatment. Two curved ribs retain the pile, and when completely loaded the movable part of rib is placed in position, completing the circle and guarding against too big a load, which could not be run into the retort. Four lugs are riveted on the under body of the car, which engage an angle iron inside the retort and prevent derailments. They have no couplers and when pulled have a cable run through a loop on each car, so that the whole load is pushed by the car farthest from the motor. The total number of buggies in use is 200, which allows any combination in way of loading which may be desired. With the plant at full capacity 30 laborers are employed handling the treated ties from the buggies and loading them on cars, and loading the untreated ties from the piles in the yards or from cars. These men are paid ¼ cent for each tie handled; they work in gangs of four. In order that the handling of ties may be done economically, the plant is not run unless cars are provided upon which to load the treated product, no provision being made to store treated ties. As treated ties burn fiercely, it can readily be appreciated why it is undesirable to have them upon the premises in any quantity.

The injecting of oil is done in two large retorts placed side by side. The building housing them is fireproof, with cement floor and slate roof, supported by steel trusses. The retorts are cylindrical, 7 feet diameter, 130 feet long, with ¾-inch shell; each will contain 15 buggies at one time, each buggy having 52 to 55 ties, which gives capacity for one loading of about 800 ties.

Through these retorts run the tracks, and the trains are run directly in at one end of the cylinder. This entire end of the retort is a cast steel door, which fits to a flange on the end of the retort, being swung on two large hinges and being supported at the bottom by a wheel. When closed it is secured by 50 bolts 2 inches diameter, which are hinged on one end, so that they may be swung free after the nuts are loosened. To open the head, the nuts are started with a friction wrench and then run back by hand, but not taken entirely off, the object being to save time. Two men can open the door and swing it in 8 minutes. As soon as the door is open two pieces of rail 10 feet in length are placed in position from the track inside the cylinder to the track in the yard, and the cylinder is in condition to load or unload.

Through the retorts and underneath the track are run 8 lengths of 1½-inch double strength pipe, through which live steam is passed to maintain the temperature of the oil at from 165° to 180° F., as a necessary part of the process is the heating of the oil during the time of injection. In order to allow for expansion and contraction of the retort due to variation in temperature, sliding plates and saddles are provided. The two center saddles upon which it rests are bolted to the concrete foundation, and all others are free to slide on metal plates imbedded in concrete pedestals, the saddles being riveted to the shell.

The creosote oil is obtained principally from domestic gas plants, tar works and similar plants, and is shipped to Shirley in tank cars of about 8,000 gallons capacity. A special track is provided for placing these cars, and the oil is pumped directly from the cars into two large receiving tanks through a 5-inch main, through which is run a live steam

pipe. These two receiving tanks are cylindrical, and built directly upon heavy concrete foundations. They have each a capacity of 180,000 gallons. Each has 56 coils of 1¼-inch steam pipe about 12 inches from the inside of the shell to keep the oil liquid, so that it may be freely pumped and not clog the mains.

The distance between the pump house and tanks is 525 feet, and the pipe line is 5 inches diameter. This combination causes some trouble, as the oil is very heavy (specific gravity 1.02½ to 1.07), and flow is greatly retarded. Directly over the retorts and extending above the roof are two tanks of 30,000 gallons capacity each, and the oil is supplied to them from the main storage tanks. The oil mains are 10 inches diameter, and duplicate valves are provided to guard against a shutdown in case one breaks. Through these overhead tanks the exhaust steam is run and the temperature of the oil is maintained at 135° to 180° F., by means of numerous live steam coils in addition to the exhaust steam. There is also just outside the retort house an underground steel tank 100 feet long and 8 feet diameter, into which the oil from the retorts is returned at the completion of a run. This tank is necessary to catch the dirt and debris from the ties and to save time in emptying the retorts.

The pump which supplies oil to the overhead tanks is so connected that it returns the oil from the underground tank to the overhead tanks; it will pump from the main storage tanks to the overhead, or from cars to overhead tanks or to main tanks. This is another safeguard against a breakdown. The vacuum pump for the removal of a surplus oil from ties is connected to the top of the retort by a main which passes through a condenser. The gauges show that with oil at 165° F. it is possible to get a 20-inch vacuum in 20 minutes and 25-inch vacuum in 45 minutes, all of which is due to the perfection of the condenser, which I am not at liberty to describe. This is a remarkable performance. The boiler room is located midway alongside the retort house and about 30 feet from it. The boilers are of the return tubular type and are rated at 200-horse power. Natural gas is used as fuel.

The following force is required to work one shift: One man at the boilers, 1 head man in the retort house with 3 men as his assistants, 12 to 16 laborers for day work only. With a double shift it would require 30 laborers, who work during daylight only. A machinist and general all-around man are also on duty.

The process is as follows: The retort is loaded with seasoned ties and the movable end secured. Oil at a temperature of 135° to 180° F. is then turned in from the auxiliary tanks above the retorts until all voids are filled, which requires about 20,800 gallons. By means of a circular gauge, which has two hands showing the amount of oil in the overhead tank to a reading of 2 gallons, and by taking a reading before turning the oil in and one when the retort is full, the exact amount of oil turned into the retort is measured. A record is then made of the number of run, time, number of ties, kind of wood and amount of oil required to fill interstices.

The gravity supply from the auxiliary tank is then cut off, the pressure pump cut in, and oil pumped from the same overhead tank until the pressure reaches 180 pounds is maintained for 3½ to 6 hours. A Bristol automatic recording gauge makes a permanent record for each 24 hours of the pressure, and the hours and minutes maintained. The card is removed at the end of the day, properly numbered and filed. The total amount of oil put into the retort is measured by the gauge above described. After the time required for treatment has elapsed, which is a matter of judgment based upon the amount of oil forced in, the kind of timber and the rate of absorption, the pressure is cut off and relieved bp a small by-pass valve discharging into the 10-inch main leading to the underground tank.

At atmospheric pressure the 10-inch valve is opened and the surplus oil in the retort is rapidly discharged into the same underground tank. All valves are then closed and the vacuum pump is started, and a vacuum of 25 inches is maintained until it is determined that a proper amount of oil has been released from the ties. Without this vacuum process, the ties would exude oil for many hours after the pressure was released, as the expansion of air within the ties would force out a considerable quantity of oil, which would be lost. On a hot day this loss is especially noticeable. Also, by the very high pressure maintained the oil is forced to the very heart of most of the woods treated and a thorough impregnation assured, the time of treatment is shortened, and still an excess of oil is not left in the tie. The surplus oil brought out by the vacuum from ties drops to the bottom of the tank and is drained to the underground tank.

After the completion of the process, no determination of the exact amount released is possible until the supply pump has returned all oil from the underground tank to the overhead tank, in which it is again measured. This is done as quickly as possible, and the amount of oil taken up by the ties is then figured. As the load has been removed, the proper time to cease treating is wholly a matter of judgment based upon experience and assisted by the records of the pressure pump and vacuum pumps, as shown by the automatic recording gauge. Should the amount contracted for per tie not appear from the figures, the load must be returned for further treatment.

To get the average amount per tie, the total amount taken up is divided by number of ties in the run, all of which is on record. To get the amount of oil per cubic foot of timber the company uses a method of approximation. A large number of ties were measured carefully and the average cubic contents for the different sizes of ties ascertained. These figures are used in all runs to get the amount of oil injected per cubic foot of timber. As the company guarantees a certain quantity of oil per tie, the process is an inverse one and the calculation is made beforehand of the amount of oil required to properly treat the load and the surplus is removed by means of the vacuum pump.

One sample tie is removed for each run made and identified by a metal tag. If an inspection of results secured is desired a number of ties are taken after treatment, sawed in two, split in sections and observations made upon the penetration of oil, which is easily detected by discoloration of the wood, as it leaves a dark stain. It might be suggested that the amount of oil in a tie could be determined by weight, but this is not as simple as it appears. Before treatment a tie may be weighed, but we cannot determine the amount of moisture in it which will be given out by immersing it in hot oil for 6 hours at a temperature of 165° F. under pressure of 180 pounds. Further than this, the distribution in the tie would be a matter of conjecture only, and the sap wood might have it all. A cross section of tie shows the distribution perfectly. The railway company has a man always at the plant who checks the reading of the gauges. As individual ties of the same wood, apparently alike in their essential features, vary in absorptive power, it follows that one tie gets much more than another, but the average amount is there, and probably more than 80 per cent. of the ties will show substantially the same results. The railway company's man has also to keep a record of cars of ties received, the inspection of them, and the loading and billing out of cars. The creosoting company stands the expense of loading and unloading cars, and the railway company of the switching and hauling. There is no variation from this in the storage yard.

As all records of each treatment are made from the gauges they deserve especial mention. Each retort has a pressure gauge, a vacuum gauge and a temperature gauge; these are automatic recording gauges. Reference may be made to them for any run at any time. As a check on them, there is also an ordinary pressure gauge and vacuum gauge placed directly below them. These 10 gauges, 5 for each retort, are assembled on one board together with a steam pressure gauge. Directly alongside this board are located the pumps and all valves for the proper distribution of oil. Above and in plain view are the gauges which measure the oil from the overhead tanks. Each overhead tank and main tank is provided with a thermometer which projects 4 to 6 feet into the interior, as the temperature of the oil is a most important matter. Each retort is provided with a thermometer in addition to the temperature gauge above described, which serves as a check on its readings.

Wet or unseasoned timber cannot be successfully treated, as the wood cells are already occupied and cannot take up the oil. In detail the treatments of various woods appear as follows:

Beech	sapwood perfectly, heart of young good, and of red heart old, not at all.
Birch	good.
Hard maple	perfectly, but hard to treat.
Soft maple	perfectly, but is of no service.
Red oak family	perfectly.
Sycamore	perfectly, but unsuited for ties on account of its brittleness.
Black gum	perfectly, is very tough and never splits, but tie plate must be used, as it is soft.
Sweet gum	sap perfectly, red heart difficult, is not as tough or strong as black gum.
Red elm	perfectly, is tough and soft.
White elm	perfectly, is soft and not strong enough fo tie.
Rock elm	perfectly, is hard and strong.
Hickory	perfectly and makes good ties.
Ash	perfectly and makes good ties.
Loblolly pine	perfectly.
Short leaf pine	sap perfectly, heart not good.
Black pine	perfectly.
Long leaf yellow pine	cannot penetrate heart.
Tamarack	sap perfectly, but cannot penetrate heart.

The only woods now being treated are the red oak family, beech, hard maple, hickory, ash and rock elm.

Some casual observations made at various times show that bark forms a perfect protection against treatment. Many ties are thoroughly impregnated and apparently have an overdose. Some ties are penetrated only to alimited extent, but as the destroying bacteria and fungus must all come from the outside, the treatment may be sufficient. No observation may yet be made of the lasting qualities of ties turned out by the company, as they have been running only about a year, and substantial conclusions cannot be drawn until ties have been in actual service at least 16 years. The cost of treatment is a matter of much interest. The rates are about 30 cents per tie for 2½ gallons of oil per tie. The oil usually costs about 6 cents, although special contracts with guaranteed amounts may reduce this figure, but this is something which we cannot arrive at accurately. The plant represents an outlay of about $75,000, and the cost of operation may be approximated from the figures given.

There is usually a large percentage of loss in creosoting plants from the evaporation of oil. In this plant the oil is confined at all times, and consequently there is practically no evaporation, even the gases removed by the vacuum pump being condensed and the oil recovered. This is possible only by reason of the specifications under which the oil is purchased, which is, that it must be a pure product of coal tar distillation, free from adulterations of other oil or substances, and when tested must have an initial boiling point of 220° C., and must distill off approximately 80 per cent. at 315° C., and the residunm above 355° C. must be soft and plastic. A variation of not more than 5 per cent. will be allowed from above distillation. The company puts little faith in analysis and none in specific gravity alone, as pitch might be added to increase it. The oils accepted run from 1.02 to 1.07½, and average near 1.05½. A chemist is constantly employed in analysis and experiments.

As to cost of ties, the woods accepted untreated run from 65 to 75 cents per tie, and their average life is about 9 years. This is a very high price, and 10 years ago the Cleveland, Cincinnati, Chicago & St. Louis Railway was purchasing ties better than it gets to-day, which cost but 40 cents apiece. The specification under which ties for treatment are now purchased is a very rigid one, and the cost of these ties untreated is 35 cents. Add to this the cost of treatment, say 30 cents, and you have a tie which costs 65 cents, exclusive of cost of loading, transportation, switching and capital invested, which considerably increases it. In order that this treated tie should last its mechanical life and not be subject to any rot, it will be important for railways to secure as nearly perfect drainage for their tracks as possible, so that the oil may not be washed out and that the tie may not be rendered soft and be cut into by the rail. The present practice of American roads which use the ordinary driven spike is most destructive to all ties, as the fiber of the wood is crushed and a hole made to hold moisture and assist in rotting out and softening the tie. The withdrawal of the spike and resetting it in gauging the track actually weakens a tie to such an extent that many ends of sound ties break off, necessitating their removal. Another practice which is most pernicious is the use of our present form tie plates, especially those with claws or ribs which cut into timber. It is my opinion that we cannot realize the proper benefit from preservative treatment of ties until we substitute a screw spike and a smooth tie plate, which I look upon as essential adjuncts in the use of treated ties. By this means there is no reason why we cannot raise the average life of ties from 9 years to 16 years.

Electric Heating.

At the convention of the National Electric Light Association, held in Atlantic City, N. J., last month, Mr. James I. Ayer read a paper on the topic named in the heading, an abstract of which is given in a recent issue of the *Electrical World*.

The author favors the introduction of electric heating devices by personal presentation, and recommends for the use of solicitors lists of meter readers' routes and a card catalogue divided into sections for a record. Circulars, or a typewritten letter with circulars, should be sent out a few days in advance, announcing a proposed call and its object. Articles should be left on trial after fully explaining their operation, and should be accompanied with complete printed instruction. The length of trial will depend upon the device; for flatirons this should be about 30 days, and in some cases sufficient time should be allowed for the customer to note the effect on his bill from the central station. The customer should be called upon at the expiration of the trial period, instead of being communicated with by mail. It is a good practice to invite prospective customers to a practical demonstration of electric heating, such as cooking a light lunch to be served to them.

The electric iron is an ideal article for the introduction of electric heating. For laundry use they are required from 3 to 5 hours per week, costing from 15 to at most 50 cents per week, the latter being for the longest period at a 20-cent rate. It is fair to say that at the average rate the average family ironing can be done at from $1 to $1.25 per month. Using the flatiron as an opening wedge it is well to follow with circulars or folders describing such articles as water cups which will furnish a pint of boiling water in 7 or 8 minutes in the smaller size, or a quart in a larger size in 10 minutes. Either will supply enough for a cup of tea in 3 or 4 minutes, and for shaving in less time. These articles are invaluable in the sick room and for use in hundreds of ways. Improvements in these devices prevent their burning out or overheating in the event of boiling dry. This result is obtained by the circuit being broken automatically if the temperature rises a few degrees above the boiling point.

An electric heating pad can always be placed in a home where there is use for a hot water bottle. Its superior merit is immediately appreciated on the briefest investigation. Aside from its usefulness in illness, it is much used by the aged as a foot-warmer. A naval officer said he had many nights walked the bridge with a pad under his coat, comfortable in bitter weather, in spite of side remarks about "a monkey on a string."

The nursery milk warmer performs its work by electricity more uniformly and perfectly than is possible with any other method and in a shorter time. An important feature is that the time required to heat it throughout to an even temperature is less than 3 minutes, making the period so short after the demand is made that peace is certain. Its operation and sanitary character produce universal commendation from physicians. These devices are furnished with a socket plug arranged to receive the lamp which it displaces in the fixture, that is lighted when current is on the milk warmer.

Electric curling iron heaters are welcomed in many homes. For light cooking and the dining room there are many useful articles. The chafing dish has many accomplishments to its credit. It can perform nearly all the operations of cooking required in homes; but, of course, in some cases not on the same scale as to quantity, and only one operation at a time, yet its possibilities are limitless when electrically heated. It can bake, boil, fry, stew and toast; is under perfect control, and always performs the same under like conditions, because its heat supply is a known quantity. It is a simple matter to cook and serve a good American breakfast for three, of a cooked cereal, eggs poached, boiled, fried or scrambled, with toast, in 30 minutes, with a chafing dish, at the cost of 250 watt hours, and coffee can be made for 100 watt hours more, a total of from 3 to 4 cents at the average residence rates. The stove which operates the chafing dish makes with a kettle a most desirable combination for the tea table, and with a coffee percolator in place of the kettle, meets the requirements of the breakfast table.

Chafing dishes, tea kettles and coffee urns can be had with heaters attached or separate in a variety of grades and designs, and there is no other method so safe, simple or as cheap for performing similar service in the dining room. The cost for energy for any single operation with any of these devices is more often 1 cent or less than more, and never exceeds 3 or 4 cents.

For equally useful devices performing much the same work and more, in the dining room or kitchen, we must remember the water cups previously mentioned come in as a part of the list, because they can be used for making coffee or tea, or boiling of any sort. In one case they are used for cooking French-fried potatoes. This type of heater is also made to form a combination of double boiler or cereal cooker, egg boiler, steamer, as well as a plain boiler.

Disk heaters, or stoves with utensils, such as saucepans, tea kettles, coffee pots, cereal cookers, vegetable boilers and the like enable the housewife with, say, 2 stoves and 2 or 3 utensils, to do all the necessary cooking for light meals, in the diningroom if she pleases, within the limits of cost previously mentioned. Stoves or disk heaters should always be supplied with utensils made for them of suitable proportions and with perfectly flat bottoms.

For general cooking there are available individual cooking devices in all sizes required for the largest household; also ovens, plate warmers, broilers, griddles, waffle irons, frying kettles, etc. Demands for general cooking will be to fill the place now occupied by gas stoves, which, except in apartment houses, are largely summer workers. Considering for the present those cases where the principal use is in summer, it is customary when using gas stoves to operate the coal range 1 or 2 days each week for supplying hot water for washing and the bath, and, of course, cooking at the same time, and this reduces in many cases the demand for service to perhaps 6 days each week.

Experience has shown from a great variety of sources that the number of watt hours per meal per person may safely be taken at 300 or 900 per day per person. If, however, we allow 1 kw-hour per person, we have 30 kw-hours for a month, which at a 5-cent rate is $1.50, or for a family of four $6 per month; or at a 3-cent rate for the same family, $3.60 per month. While these figures are absurdly low to-day for lighting rates in residences, there are many cases where the service may be given from separate service wires at a satisfactory profit.

By careful comparison it has been determined that in cooking an equivalent cost for $1 gas is 2½ cents per kw-hour, and while electric cooking is widely practical at a higher rate, it will demand from 5 to 3-cent rates to make it an important competitor to gas. Gas, however, occupied a broad field at a much higher price than coal, due to its advantages, and electric methods make it possible to secure equal results because of the many advantages possessed by the newer method over the old.

For heating the general water supply a kitchen boiler of the usual type is used varying in capacity from 10 to 30 gallons, and supplied preferably with a heater contained in the boiler of a maximum of 2,000 watts, which may be reduced to 1,000 or 500 watts by a controlling switch. Such a boiler should be jacketed with ordinary pipe covering, and with care is not necessarily an excessively expensive luxury. A 10-gallon boiler can be heated to 150° F. with approximately 2½ kw-hours, which will answer a very considerable demand throughout the day from a jacketed boiler of that capacity.

For bath water, heaters are supplied to place in the tub, and if of 2,000-watt capacity are frequently satisfactory to those who understand in advance that it requires 2,000 watts for an hour to raise 20 gallons of water through 40° F.

Radiators for occasional use in bedrooms for short periods are practical and useful, but should have a capacity of not less than 1,000 or 1,200 watts to be at all effective, except in the case of small rooms, and should be larger for large rooms. For heating the bathroom many radiators are sold which, to be effective quickly, should have 2,000 watts capacity. Of this size, if turned on for 15 or 20 minutes, they fully accomplish their purpose, and are not expensive to the owner.

The instantaneous hot water heater to be practical requires that current supply of 3,000 watts and more is available. While for small quantities the cost of operation is not excessive, the service demand is undesirable and it is expensive to install; and as small water heaters are so much more simple and easy to supply, they meet the demand for small requirements. The field of water heating radiators in any community, with rare exceptions, is very limited, yet the sale of these devices reaches a very considerable sum annually, and is daily increasing.

The service for a family kitchen for the average family for cooking should have a capacity of about 3,000 watts, and if a kitchen boiler, bath water heater or bathroom radiator is to be included, a double-throw switch can be installed in the kitchen or other convenient place so connected as to throw off the boiler, radiator or bath circuit when the cooking circuit is required, and to avoid the necessity of extra large service capacity which would otherwise be necessary. This also suggests a method of limiting the hours for cooking service to a period when lights are not required, but it has objections, although it is practical.

The cost for heating 1 gallon of water to different temperatures at different rates is given in the accompanying table, the initial temperature being 60° F. and the efficiency of apparatus 85 per cent.

Total Temperature.	Watts Used for				Cost in Cts. with Current at			
	5 m.	10 m.	20 m.	1 hour	3 c.	5 c.	10 c.	20 c.
100°.....	1,296	648	324	108	.32	.544	1.088	2.17
150°.....	2,976	1,488	744	48	.74	1.24	2.48	4.96
175°.....	3,744	1,872	936	312	.94	1.56	3.12	6.24
200°.....	4,608	2,304	1,152	384	1.15	1.92	3.84	7.68
212°.....	4,992	2,496	1,248	416	1.25	2.08	4.16	8.32

The policy to pursue is to personally press the sale of small household devices constantly, without complicating the situation by trying to interest customers with the larger problems, until from experience with the smaller they have become prepared for further ventures. During such a period one should gain practical experience in the larger problems in his own house. The small devices will earn from $1 to $2 per month, which will cover present transformer losses and leave a profit. When business depression comes one may cut off his electric signs, but not likely a house service, which provides many conveniences besides light.

SPECIAL ENGLISH CORRESPONDENCE.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, ENGLAND, Sept. 10th, 1906.

Progress and Gas Lighting.—Another Safety Lamp Failure.—Coal Tar the Best Means of Laying the Dust.—Gas Motor Tram Cars.

Last season I had occasion to remark that, notwithstanding contiuual beating of the big drum on the part of those interested in other methods of lighting, there was no reason to anticipate that the original purpose for which gas was introduced was in danger of even a partial eclipse, and the same may be repeated with even greater emphasis to-day. Very great activity is being exhibited, especially in the line of inverted burners, and our technical literature abounds with illustrated descriptions of novelties—the current issue of the *Journal of Gas Lighting* contains no less than four—while almost every post brings pamphlets and illustrated circulars. A recent issue of the *Ironmonger* sums up the situation with conspicuous accuracy, and when one is accustomed to find in journals outside our own circle that gas affairs are dealt with in an ignorant and misleading style, there is the more reason for congratulating the editor of this publication on the fact that he understands what he is writing about, and is able to take an accurate birds-eye view of a subject covering a very wide range. He says that although no epoch making discoveries have been announced, so many individually trifling advances have been effected, that the makers of gaseous illuminants, and also the dealers in accessories for the same, ought to feel fairly satisfied with the present position. The inverted gas burner appears to be carrying everything before it. A few days ago it was announced that the Corporation of Edinburgh had decided to light the streets of their city by means of inverted gas burners. The burner is also forcing its way into railway carriages especially on the Continent. It is a little difficult to realize that the mantle will stand the vibrations of moving trains, but this being proved to be the case, the inverted burner seems manifestly the best. French results are in favor of the upright burner, and we are met with the curious situation that one large Continental railway company are busy fixing upright burners, and another is equally busy in adapting inverted burners to all the rolling stock. The beneficial effect of gas lighting on the natural ventilation of rooms by diffusion, which, like the beneficial sterilizing action of the naked flame, was formerly ridiculed, has been increasingly proved by experiments during the past year, and few people will now deny that the atmosphere of a gas lighted and occupied room may be fresher at the end of the evening than the atmosphere of a similar apartment lighted by electricity.

The last paragraph explains one reason why many are returning to gas after having tried other systems. So much was made of the poisonous effects of products of combustion, and of the dangers of escaping gas, that people were led to believe that by cutting gas off they would secure a purer atmosphere and healthier homes. Attempts were made to utilize to the full the nervous dread of disease and poison that is such a feature of the present day—there never was such a good time for makers of disinfectants and preventatives—and people were even solemnly warned that a gas pipe carried through a living apartment was a menace to health. Gas contains carbonic acid, it was said, and no pipe is actually sound, so quantities of the poison, too minute to be detected by smell, but sufficient to lower the tone of the system, might and would find their way into the room. So much of this sort of thing has been circulated that at last it defeats itself, and common sense points out that there is no difference between the health and vitality of people who pass their lives in the vicinity of gas pipes and gas lights as compared with those who do not. A continuous current of air is flowing through the cylinder of an incandescent burner, or the globe surrounding a flat flame, and the chances are that any malignant microbes present will not survive the passage. But, put shortly, the services of the physician, the painter, and the paper hanger are found to be required quite apart from whether gas is used or not, and the question of gas or —— is decided upon the common sense basis of cost, light for light. This is the spirit that has animated the Corporation of Edinburgh in their decision as above noted. They own both the electricity and the gas supply, and therefore have no animus one way or the other and only want the cheapest and the best. And a room so completely unventilated that a gas light cannot be burned in it without vitiating the air to an unpleasant or harmful extent may be unhesitatingly condemned as unfit for occupation.

There has been another purifier house explosion on similar lines to that at Saltley, seeing that in both cases misplaced confidence in a so-called "safety" lamp was the primary cause. The scene was in the

same neighborhood, at Coventry gas works. On a Sunday evening in July it was found that the gas being made was not passing forward to the holders. On the day previous, which also happened to be the date of the workmen's annual outing, one of the purifiers had been emptied and refilled, and, as events subsequently showed, the cover was not properly secured. Perhaps on account of the event just mentioned the regular purifier house hands were away. The works' manager proceeded to go round the works and went into the purifier house, not taking any light with him or intending to have any, as he could find out if the covers were all right without. But three of the workmen, no doubt under the impression that they might be of service, and believing that the so-called "safety" lamp was everything that its name implies, followed him into the house provided with the fatal lamp. As soon as they reached the vicinity of the box that had been changed, and before any of them had even noticed a smell of gas, an explosion occurred, resulting in severe injuries to the party and one of them was killed. In this sad event we have an announcement even in more strident terms than at Saltley, that lamps of the so-called safety type, as invented by George Stevenson, however reliable in respect to firedamp in mines, are more than useless in gas works. Evidently they afford no protection against a strong mixture of gas and air. It appeared that the manager of the works, having knowledge of the Saltley disaster, had condemned the "safety" lamp and ordered it to be destroyed, and provided electric lamps for use under the circumstances such as above. But there appeared also to have been an impression that the electric lamps were substituted as being lighter and more convenient, giving a clearer light, which was supported by the fact that the manager's orders with effect to the "safety" lamp were not carried out. At Saltley there is reason to believe that the lamp afforded a protection against explosions for some appreciable time, but at Coventry the failure was instantaneous. And after such a very decisive example of failure the manager who retains a "safety" lamp on the works will be guilty of criminal negligence. As much applies to any person offering lamps for sale as such to managers of gas works. Apart from the question of safety an electric glow lamp and storage battery is much more portable and gives a better light than the safety lamp. It can be secured by a belt or strap to the person, leaving both hands free.

The question of the use of tar as a dust preventative on our public roads continues to attract a great deal of attention, not only amongst gas managers on the lookout for another line for disposal of tar, but amongst those interested in the prevention of dust, who may be divided into two classes, those responsible for the care of the roads, and those who use them. The class first named look at the £ s d. of the question, the second at the nuisance. Road surveyors and authorities are more concerned with the fact that the dust necessitates increased expense for watering, and that its removal increases appreciably the cost of wear and tear, whilst travelers, whether in motor cars or otherwise, object to the dust as being matter in the wrong place. The subject has been treated at length in literature specially devoted to municipal matters, and also in that pertaining to automobiles, because of all the various methods of dust prevention that have been suggested, coal tar appears to be the cheapest, while at the same time efficient and unobjectionable. One method that has been tried is the use of deliquescent salts such as chloride of calium. These maintain the surface so treated in a damp condition for a few days, perhaps a fortnight, but, of course, disappear with the first shower and may cause trouble by polluting brooks or water courses. If this does not happen the expense of repeating the treatment two or three times a month is a serious drawback, and sometimes after a cold night the dampness is too pronounced. Coal tar, so far from being an additional expense, is actually a source of economy, as it enhances the life of the roads and reduces the cost of repair. At a recent meeting of the Welsh and Monmouthshire Gas Engineers a valuable practical paper giving actual experience on the matter was submitted by Mr. Walter Lister, of Godalming. After some reference to the various expedients that have been tried, he very pertinently asks why the simplest and cheapest remedy, the application of tar as a paint, should not be applied to all the principal roads in the country. They could be so treated as to last throughout the season at a cost not exceeding £45 a mile, without interfering with the traffic. The work should be done in hot and dry weather while the surface of the road is warm, and half the section of the road should be taken at a time. A portable tank in which the tar can be brought up to boiling point is required. The surface is swept clean, and free from dust and grit, and the tar drawn off into smaller tanks fitted with a 1-inch flexible tube and 2-inch cross spray and distributed as speedily as possible while still hot. If well brushed in by means of hard brooms it will penetrate to a depth of 2 inches. Traffic may be resumed in 12 hours and sand or dust if used at all should be applied very sparingly. The actual cost of treating a mile of road 21 feet wide was under £45, whereas the cost of watering would be £10 each time, and the author proceeds to deal with the special objections to water. In the course of a discussion Mr. Canning referred to roads in the neighborhood which had been successfully treated at a cost about the same as that named in the paper, or less than 1d. per square yard. In reply to the suggestion from a known authority that distilled tar was required and that raw tar was useless, it was explained that the point in view was the necessity for using tar quite free from ammoniacal liquor. The gentleman in question wanted the tar to be free from water and objected to ammoniacal fumes caused by boiling imperfectly separated tar by the side of the road. Mr. Acland enlarged on the necessity for proper preparation of the road, and the use of the right material, and said that unless the road was properly prepared and rolled the painting would not be a success.

In this connection some reference may be made to the experiences of Mr. Maybury, surveyor to the Kent County Council, who has 750 miles of road under his charge, and as many of them extend from London to seaside places, probably the heaviest motor traffic in the Kingdom. There is not only intermittent traffic, but many business men reside at the seaside, 40 or 50 miles out, during the summer, and go backwards and forwards several times a week in their cars. Mr. Maybury has been buttonholed by a representative of the *Gas World*, and after some 3 years' experience he states that tar properly applied on a good, hard granite surface, makes a perfect road. Kent ragstone and flints are easily disintegrated and therefore do not make such good work. Some 37 miles of road have been treated in Kent this year, and altogether some 50 miles have been covered. The tar bill for the last quarter was over £1,600, and taking the cost of tar at one penny per gallon, the cost of the first coat is 1½d. per square yard, but over a series of years it would not exceed 1d. As at present applied the cost of labor was heavy besides being slow, and a suitable machine for distributing the tar would be a great advantage. The Automobile Club has offered a prize for such a machine, and he thought that owners of cars as a rule would be glad to contribute towards the cost of laying the dust.

The paper on tar for roads was by no means the only interesting feature of the Welsh meeting. The President, Mr. R. Browning, of Neath, mentioned that for some years past the tram cars in his district had been driven by means of town gas with satisfactory results, the cost being less than 1s. per car mile. The cars are self-contained and of the ordinary type with garden seats, and all machinery is inclosed from sight, clean in working and free from nuisance either of vibration, heat or smell. By means of a special patent lubricating arrangement the disagreeable odor common to gas engines is prevented. The motor is a double cylinder gas engine, Otto type, so arranged that all the parts can be easily reached for oiling, cleaning or repairing, and is kept continually running while the car is in service. It is completely under the control of the driver, who can reverse or regulate the speed within the limits of 8 and 1 mile per hour, and the supply is taken from the town mains, compressed to about 8 atmospheres and delivered to reservoirs under the car, which contain when fully charged sufficient gas to run the vehicle 8 miles without risk of stoppage. The reservoir can be recharged in 1½ minutes, at any point on the line where it is convenient to store the compressed gas. Some little difficulty was experienced at first through trying to run the machines without skilled engineering supervision, but as soon as a practical man took control no further trouble was experienced.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

MR. J. T. FORD, an employee of the Gas Department, Richmond, Va., for over 20 years, died at his home in that city the afternoon of the 12th inst. He was in his 58th year.

MR. JAMES P. HAMILTON has been re-elected Secretary of the Worcester (Mass.) Gas Light Company.

AT the annual meeting of the shareholders in the Boston (Mass.) Consolidated Gas Company the officers elected were: Directors, S. F. Adams, S. R. Anthony, Walter C. Bayles, Samuel Carr, Henry B. Chapin, N. Rantoul, James L. Richards, Jos. B. Russell, Chas. G. Smith, Fred. E. Snow, Wm. S. Spaulding, C. A. Stone, C. M. Weld and Robert Winsor; Treasurer, Robt. Grant; Clerk, Fred. Tudor.

THE following notice has been received by the shareholders in the Providence (R. I.) Gas Company: "An increase of the capital stock of the Providence Gas Company having been authorized, the Treasurer will issue 5,000 shares of new stock, which is offered to shareholders of record at the close of business Monday, September 10th, 1906, in the ratio of one share of new stock for every 13 shares of old stock held by them as aforesaid, at the par value of $50 per share, payable in cash on or before Tuesday, October 2, 1906. No certificates for fractional parts of shares will be bought or sold by the Company. All new stock not taken and paid for at the close of business, Tuesday, October 2, 1906, may be disposed of by the Directors at their discretion." The present capitalization of the Company is $3,000,000.

MR. W. A. WILSON, Superintendent of the Portage American Gas Company, says that the bettermentson storage account will be completed by December 1st. The summer output at Portage this season showed a most satisfactory increase over that of a year ago.

THE new schedule of selling rates in force at Rutland, Vt., is as follows: Up to 10,000 cubic feet per month, $1.50 per 1,000, less 10 per cent. for prompt payment; above 10,000 cubic feet, $1.20 net.

"W. S. M.," writing from Cincinnati, O., under date of the 15th inst., says that the lease of the Cincinnati Gas and Electric Company to the Union Gas and Electric Company, which was filed with the County Recorder some days ago, is not a perpetual one the same expir-

ing October 1, 2005. The rentals are adjusted as follows: From September 1, 1906, to September 30, 1908, 9 quarterly dividends of 1⅛ per cent. each; from October 1st, 1908, to September 10th, 1910, an amount equal to 8 quarterly dividends of 1 3/16 per cent. each, and during the period of 95 years thereafter an amount equal to 380 quarterly dividends of 1¼ per cent. each. These dividends are payable on the 10th day of September, December, March and June of each year, also the sum of $20,000, payable in equal quarterly installments each year. This is intended to cover the cost and expense of maintaining the organization and provide for the salary for officers and employees. The lessee is also to pay an amount equal to the interest on the outstanding 5 per cent. 20-year bonds of the Cincinnati Edison Electric Company. In addition to the rent the leasing Company is to pay all the taxes, charges and assessments of all kinds. The lessae further agrees to expend during the first 5 years of the term at least $2,000,000 in improvements, and any further improvement shall be paid by the issue and sale of new stock.

THE New York State Commission of Gas and Electricity has named October 9th as the date for a preliminary hearing on the petition of Mayor Adam, of Buffalo, who declares that the price charged for gas by the Buffalo Gas Company is excessive, and that the quality thereof is not up to the legal requirement.

ADVICES from Toledo, O., under date of the 15th inst., are to the effect that a day or so before the Circuit Court of the United States handed down a decision allowing a judgment of $678.62 to the Northwestern Ohio Gas Company and $690.51 to the Eastern Ohio Gas Company, against Col. George P. Waldorf, as internal revenue collector. The plaintiff corporations were taxed as transportation companies under the Spanish-American war tax of 1898, but paid under protest, and later on suit was brought against Col. Waldorf as the representative of the revenue department for the return of the sums paid. In their complaint the Companies alleged that their lines were not public ones, but were managed and operated for their own use, wherefore they could not be taxed as transportation companies.

THE proprietors of the St. Augustine (Fla.) Gas and Electric Company have announced a reduction in the selling rates. Under the new schedule the net charge is to rule at $1.60 per 1,000 cubic feet for gas used for all purposes. Heretofore the net schedule was: On lighting account, $1.75; for fuel use, $1.50.

THE scheduled hearing before the Massachusetts Board of Gas and Electric Light Commissioners, on the order adopted by the last Legislature instructing the Board to investigate and report to the next General Court on the feasibility and advisability of compelling the adoption of automatic closing devices on gas fixtures really did not excite any public interest whatever, the only ones present besides the officials of the Board were Mr. W. A. Wood, representing the Boston Consolidated Gas Company, and Mr. G. T. Cortis, of the Gas Appliance Exchange. Mr. Wood in speaking to the question said that a law compelling the adoption of self-closing devices would be not only unjust, but that it could not be enforced. He assured the Commissioners that if his Company could procure a device of the sort specified that could be depended on it would at once adopt it. Although apparatuses of that nature were being constantly invented, the witness declared that he had tested many devices, but never found one which did not fail occasionally, and that under such failure the cure would be worse than the disease. He described a test made by him within a month with one device, the result of which test was that his office was filled with gas that leaked from the burners during the night. He declared that the chief trouble with apparatus of the kind was that all of them depended for action on the elasticity of metal under heat and cold, and they were bound to lose such elasticity within a short time. Responding to questions by Commissioner Schaff, Mr. Wood averred he had never heard of an automatic device of the sort under discussion having been satisfactorily used in America or elsewhere. Mr. Cortis said his experience in making experiments on the apparatus under consideration corresponded with that related by Mr. Wood. He had not found one that was reliable. Some which promised favorably in the laboratory failed utterly in the succeeding practical tests. He thought the places where automatic burners were most needed were the places where they would get the least care, and most of them must be handled very carefully, the adjusting mechanism being very delicate. The Commissioners took the testimony under advisement.

THE Gas Machinery Company, of Cleveland, O., informs us that it has been awarded a contract to construct an 8-foot set of water gas apparatus in the works of the San Antonio (Tex.) Gas and Electric Company.

"W. B.," writing from St. Johnsbury, Vt., says that the St. Johnsbury Gas Company has secured the services of Miss Jessie Loveridge, of Rochester, N. Y., and of Mr. W. J. Daniels, of the Detroit Stove Works, who have arranged to give a sequence of demonstration lectures in the use of gas for cooking, the series to be held in the local opera house, commencing 2:30 P.M. to-day, continuing each afternoon to the evening of Saturday next. The lectures end at 5 P.M., and they will all be illustrated in the most approved practical fashion.

THE Norwalk (Conn.) *Hour*, of recent date made the following criticism of the results of ownership and operation of the named public service utilities on municipal account: "The recent shutting down of the municipal gas plant of Hamilton, O., is of more than ordinary interest, because that city is a most thorough-going example of a city with a population over 25,000 that has built and operated its own water works and gas and electric light plants. As these plants have been in operation for 22, 16 and 10 years respectively, they offer a fair basis for gauging the efficiency of municipal operation, the advocates of which have until recently held up Hamilton as an example for other cities to imitate. On March 9th a report on the financial condition of these plants was filed with the State Auditor, by Mr. L. B. Cooke, special examiner of the State bureau of inspection and supervision of public offices. In this he shows that, considering operating expenses only, the gas and electric light works incurred losses for the 3 years ending December 31, 1905, of $16,689 and $4,426 respectively, while the water works show a profit on paper of $12,797. When a proper allowance is made for depreciation, interest, insurance and lost taxes, it appears that the aggregate loss of these three plants for the 3 years exceeds $230,000. * * * After the filing of this report the Board of Public Service of Hamilton requested Mayor Weaver, of Philadelphia, to send an expert to examine the gas plant. On the advice of this expert, Mr. Wm. E. Maher, the plant was closed and a contract was made by which the Hamilton Gas and Electric Company is to supply from its plant at Coke Otto, all the gas required by the city and its customers. The Hamilton correspondent of the Cincinnati *Post*, who is evidently a firm believer in municipal ownership, states that 'the failure of the city plant is due to the fact that it was made a refuge for heelers who were too tired to work,' and adds that the same road that was traveled by the gas plant is now being travelled by the electric plant. He might well have included the water works also, for the Board of Public Service is asking for $10,000 to rehabilitate it, as well as for $125,000 for the reconstruction of the lighting plants. Whatever effect politics may have had upon the gas plant, its failure was due quite as much to the total ignoring by those having it in charge of the relation between price and cost. * * * All that can be said for the city plant is that it may have slightly anticipated the reduction in price that has generally resulted from the introduction of new methods; but to accomplish this it laid upon the taxpayers a burden greatly in excess of any saving in the price of gas."

IT pleases us greatly to be able to say that Mr. F. Ward, of the gas division of the properties of the Beloit (Wis.) Water, Gas and Electric Company, has quite recovered from the illness that put him out of commission some weeks ago.

REPLYING to the question recently put to him by a representative of the Cincinnati *Times-Star*, relative to the purposes of the Columbia Corporation (incorporated some time ago), which proposes to supply natural gas in Cincinnati and Cleveland, O., Mr. Norman Kenan, President of the Union Gas and Electric Company, of Cincinnati, said: "This (the Columbia Corporation) is most likely an incorporation of interests with which the Cincinnati Company has long had a contract, and affects in no direct way the Cincinnati Corporation."

THE parties in interest in the Chelmsford (Mass.) Gas Light Company have petitioned the authorities of Lowell for the right to distribute and sell gas therein. The Board of Aldermen will formally discuss the matter on the 27th inst.

THE Lynchburg (Va.) City Council some time ago appointed A. G. Kerr an expert to determine as to whether or not the gas being supplied by the local lighting company was up to contract requirements. The report subsequently submitted must have been satisfying to the authorities and gratifying to President Apperson and his associates, since Mr. Kerr found the illuminating power was 2.32 candles above the requisite, that the heating value was averaging 659 B. T. U. to the cubic foot, and that in purity the gas conformed to even rigid stipulation. Referring to the physical condition of the works, Mr. Kerr said: "The plant was found to be completely equipped for the manufacture of both coal gas and water gas, with the most modern and up-to-date appliances and apparatus. Every department, so far as could be seen, was in good working order, and the evidences of careful and competent administration were apparent throughout."

AT the annual meeting of the Westbury (Mass.) Gas and Electric Company the officers elected were: President and Superintendent, George L. Smith; Clerk, B. S. Goldthwait; Treasurer, Vincent Goldthwait; Directors, G. L. Smith, B. S. Goldthwait, F. V. Bartlett and E. A. Hersly.

MR. I. K. GAFFNEY has been appointed Superintendent of the plants of the Orange County Gas and Electric Company, Middletown, N. Y.

MESSRS. H. M. BYLLESBY & Co. inform us that they have been retained as consulting, designing and supervising engineers for the modern gas plant being built for the Indiana Steel Company, Gary, Ind.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

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NOTIFICATION RESPECTING ADVERTISING.

Orders for new advertising, or for changes in standing advertisements, to insure attention in the issue following their reception, must be in hand any time of Wednesday.

AGENTS:

New York—American News Co., 39 and 41 Chambers St.
Germany—Lemcke & Buechner, of New York.
England—Aug. Siegle, 30 Lime Street, London.

MONDAY, SEPTEMBER 24, 1906.

The Market for Gas Securities.

The market for city gas shares was featureless during the week, the opening prices this morning (Friday) being the same as those of last Friday. Trading was very light, save in the instance of accredited bond issues, several transfers therein being recorded. Brooklyn Union shows no change.

Peoples, of Chicago, sold off a trifle, but the buying af the security indicates purchases on the part of those who likely know of anything tending to affect the market. The Boston Consolidated Gas Company has declared a regular quarterly dividend of 1¼ per cent. The good buying movement in Massachusetts gas continues.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

SEPTEMBER 24.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	139	140
Central Union Gas Co.—				
1st 5 s, due 1912, J. & J.	3,000,000	1,000	101	104
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	..	105
Mutual	3,500,000	100	190	225
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	99	101
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	37	43
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	..	98	104
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	101	103
New York and East River—				
1st 5 s, due 1941, J. & J.	3,500,000	1,000	108	111
Con. 5's, due 1945, J. & J.	1,500,000	..	104	110
Standard	5,000,000	100	140	160
Preferred	5,000,000	100	155	175
1st Mtg, 5's due 1930, M. & N.	1,500,000	1,000	104	108
The Brooklyn Union	15,000,000	1,000	122	130
1st Con. 5's, due 1948, M. & N.	15,000,000		107	..
Yonkers	299,650	500	130	..
Out-of-Town Companies.				
Bay State	50,000,000	50	5/16	¾
" Income Bonds	2,000,000	1,000	..	75
Binghamton Gas Works	450,000	100	..	65
" 1st Mtg. 5's	500,000	1,000	95	100
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	9	10
" " Bonds, 5's	5,250,000	1,000	75	80
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000	..	..
Chicago Gas Co. Guaranteed Gold Bonds	7,850,000	1,000	104	106¾
Cincinnati Gas and Electric Co.	29,500,000	100	100	100¼
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	90	..
Columbus (O.) Gas Lt. & Heating Co	1,682,750	100	..	95
Preferred	3,026,500	100	107½	108
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	82	87
Mortgage, 6's	3,000,000	..	..	118
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
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Consolidated Gas Co. of N. J.	1,000,000	100	15	17
Con. Mtg. 5's	880,000	1,000	92	95
Bonds	75,000	..	..	100
Detroit City Gas Co.	5,000,000	50	..	50
" Prior Lien 5's	4,618,000	1,000	..	98
Detroit Gas Co., 5's	381,000	1,000	75	80
" Inc. 5's	16,000	100	92½	100
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	39	40
Fort Wayne	2,000,000	..	..	..
" Bonds	2,000,000	..	55	..
Grand Rapids Gas Lt. Co. 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	..	110	112
" Bonds, 5's	10,500,000	..	107½	108½
Indianapolis	2,000,000	..	60	70
" Bonds, 5's	2,650,000	..	104½	105
Jackson Gas Co	250,000	50	82	..
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	35
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	.	105
Preferred	2,500,000	100	95	110
Bonds	16,000,000	1,000	104	104¼
Lafayette Gas Co., Ind.	1,000,000	100	..	50
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas & Elec. Co.				
" 1st Mtg. 6's	350,000	1,000	106	108¾
" 6 per cent. scrip, due 1910	100,000	25	85	87
Massachusetts Gas Companies of Boston	25,000,000	100	59	59¼
Preferred	25,000,000	100	88	88¾
Montreal, Canada	2,000,000	100	218	218¾
Nashville Gas Lt. Co.	1,000,000	100	110	..
Newark, N. J., Con. Gas Co.	6,000,000	..	56	58
Bonds, 6's	6,000,000	..	137	138
New Haven	2,000,000	25	200	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	84¾	90
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1,000	..	..
2d "	2,500,000	1,000	104	..
Rochester Gas & Elec. Co.	2,150,000	50	88	..
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000	..	104½	105¼
San Francisco, Cal.	15,800,000	100	..	..
St. Joseph Gas Co. 1st Mtg. 5's	751,000	1,000	92	..
St. Paul Gas Light Co	1,500,000	100	45	47
1st Mortgage 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	113½	115
General Mortgage, 5's	2,465,000	1,000	96¾	..
Syracuse, N. Y.	1,975,000	100	50	55
Bonds	2,047 000	1,000	102	..
Washington, D. C	2,600,000	20	285½	290
First mortgage 6's	600,000	..	..	..
Western, Milwaukee	4,000,000	..	..	..
Wilmington, Del.	600,000	50	230	..

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DIVIDEND NOTICE.

OFFICE OF THE UNITED GAS IMPROVEMENT CO., N. W. CORNER BROAD AND ARCH STS., PHILADELPHIA, PA., Sept. 12, 1906.

The Directors have this day declared a quarterly dividend of 2 per cent. (one dollar per share), payable Oct. 15th, 1906, to stockholders of record at the close of business, Sept. 29, 1906. Checks will be mailed.

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Address, "D. H.,"
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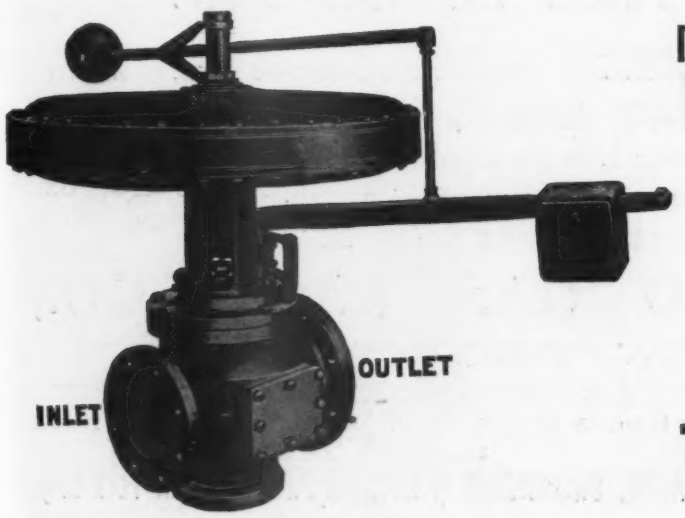

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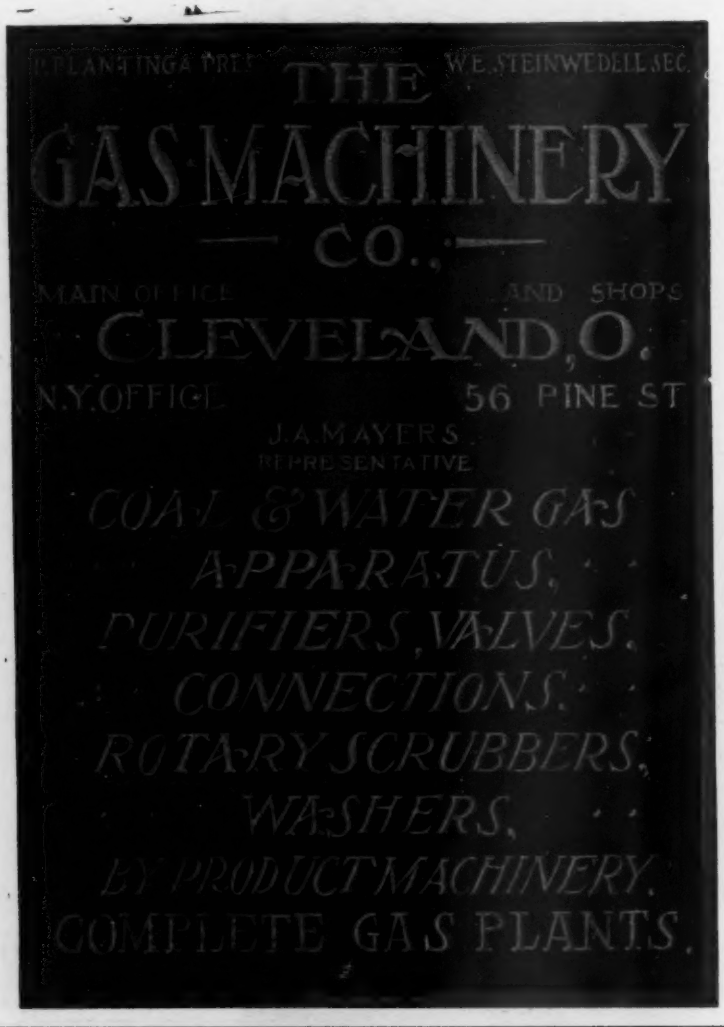

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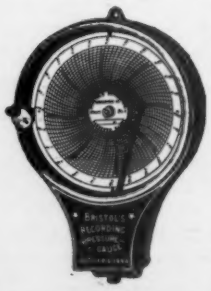

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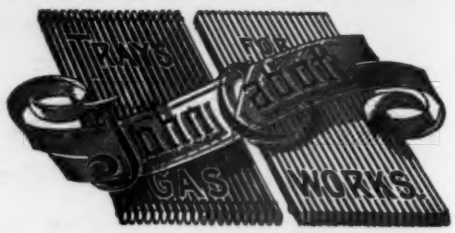

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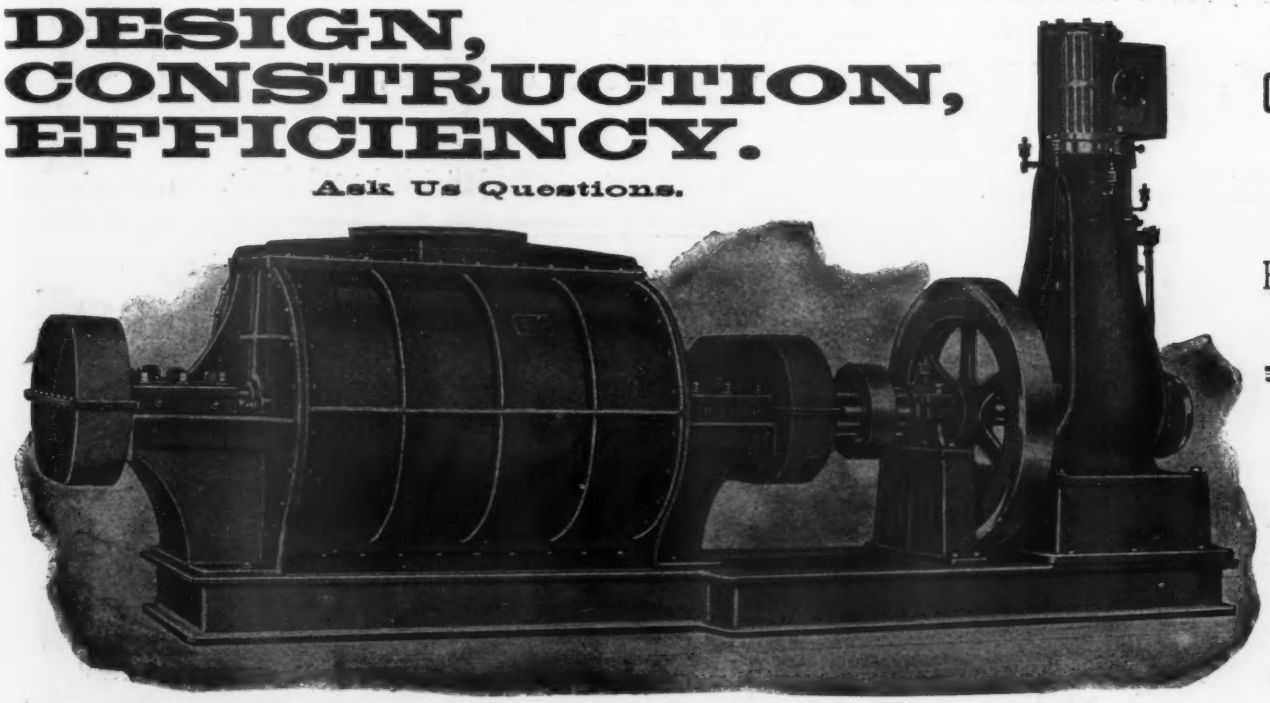

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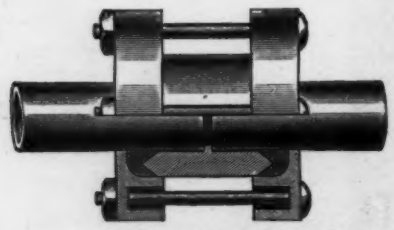

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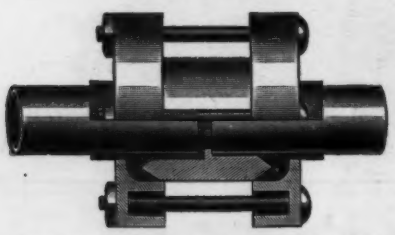

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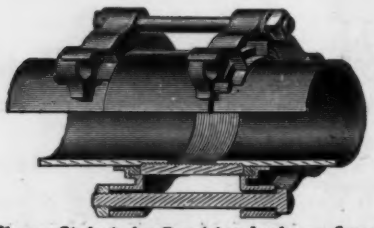

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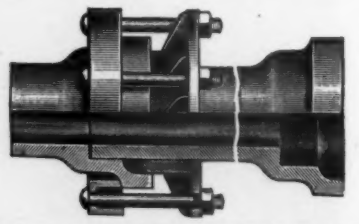

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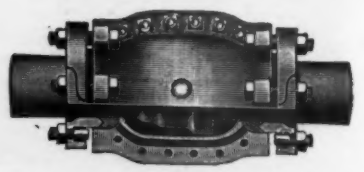

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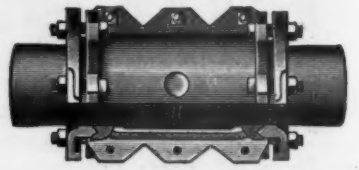

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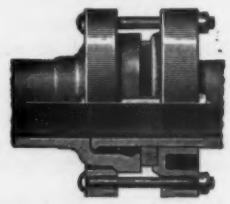

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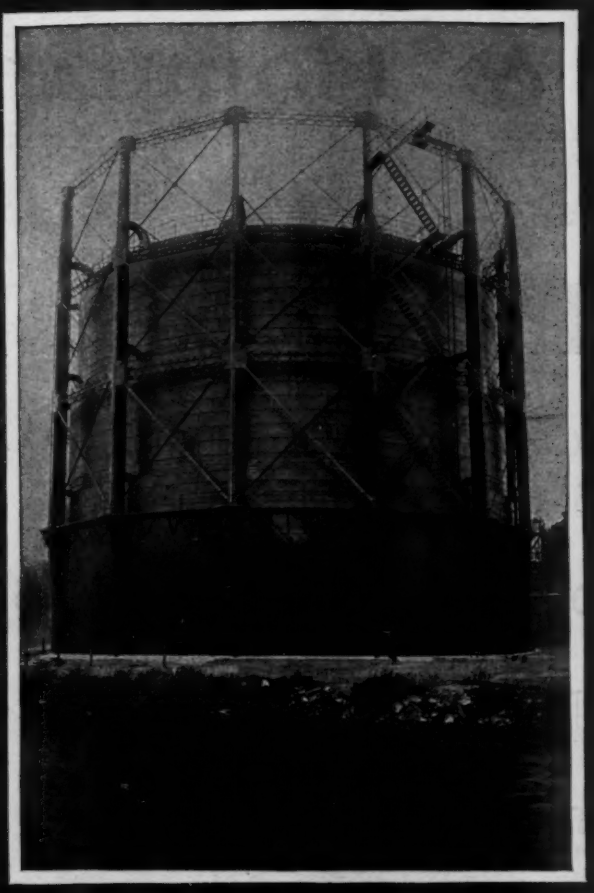

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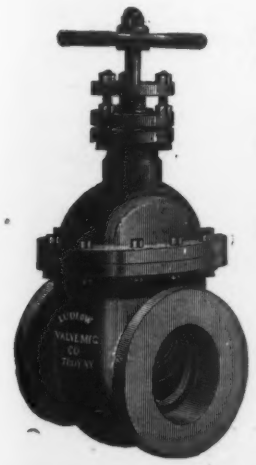

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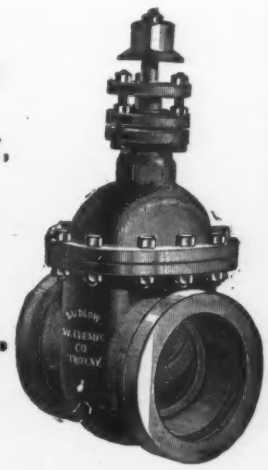

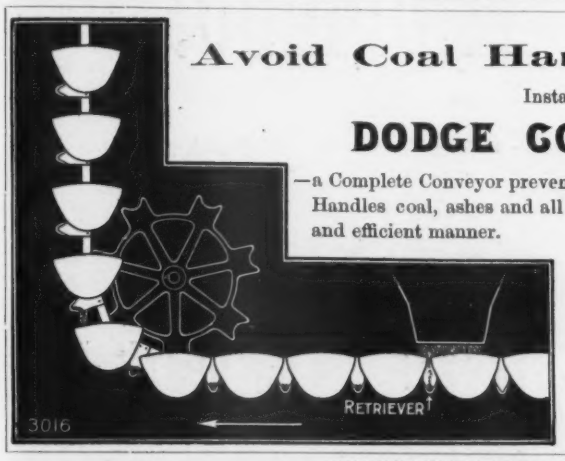

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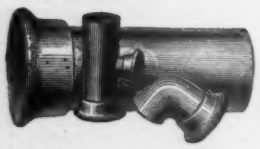

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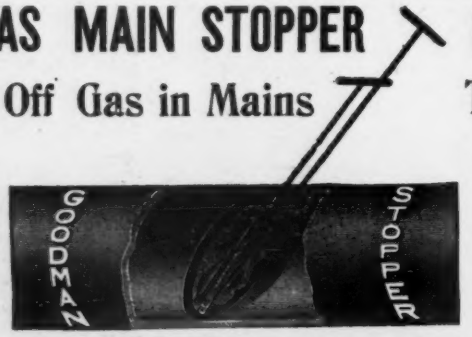

Temporarily during alterations and repairs. : : : :

STOPPERS SENT ON TRIAL.

Address: SAFETY GAS MAIN STOPPER CO., 552 E. 135th St., New York City.

HIGH SPEED BRIDGE TRAMWAYS

Revolving or with lateral traverse.

Illustration shows one of the latter type at the Point Breeze Works of the United Gas Improvement Co., Philadelphia. It is steam operated and equipped with a 1½-ton self filling bucket.

Write for booklet and full details.

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THE PURIFIED GAS REVIVES THE FOULED OXIDE.

FIELD'S ANALYSIS

For the Year 1905.

An Analysis of the Principal Gas Undertakings in England, Scotland and Ireland. Being the 37th Year of Publication.

COMPILED AND ARRANGED BY **JOHN W. FIELD,**

Secretary and General Manager of The Gas Light and Coke Company, London.

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Photometrical and Experimental Apparatus.

PUBLIC LIGHTING TABLE.

OCTOBER, 1906.

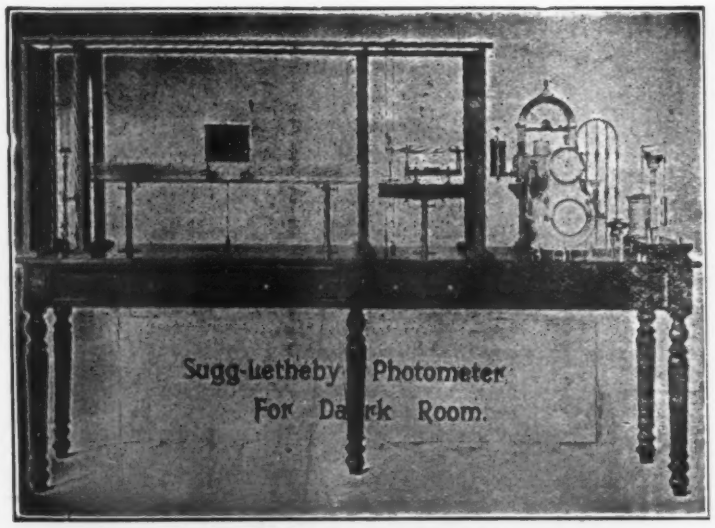
Table No. 1.
FOLLOWING THE MOON.

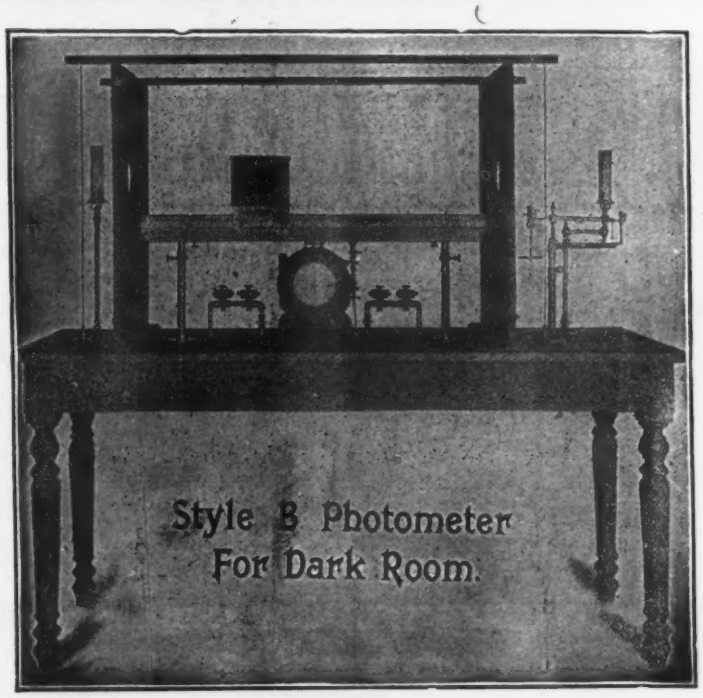
Day of Week.	Date.	Light.	Extinguish.
Mon.	1	No L.	No L.
Tue.	2	No L. FM	No L.
Wed.	3	No L.	No L.
Thu.	4	6.10 PM	8.10 PM
Fri.	5	6.10	8.40
Sat.	6	6.10	9.10
Sun.	7	6.00	9.50
Mon.	8	6.00	10.30
Tue.	9	6.00	11.20
Wed.	10	6.00 LQ	12.10 AM
Thu.	11	6.00	1.00
Fri.	12	6.00	2.00
Sat.	13	6.00	3.10
Sun	14	5.50	5.10
Mon.	15	5.50	5.10
Tue.	16	5.50	5.10
Wed.	17	5.50 NM	5.10
Thu.	18	5.50	5.10
Fri.	19	5.50	5.10
Sat.	20	5.50	5.10
Sun.	21	5.40	5.20
Mon.	22	8.20	5.20
Tue.	23	9.20	5.20
Wed.	24	10.30 FQ	5.20
Thu.	25	11.30	5.20
Fri.	26	12.40 AM	5.20
Sat.	27	1.40	5.20
Sun.	28	2.40	5.30
Mon.	29	3.40	5.30
Tue.	30	No L.	No L.
Wed.	31	No L. FM	No L.

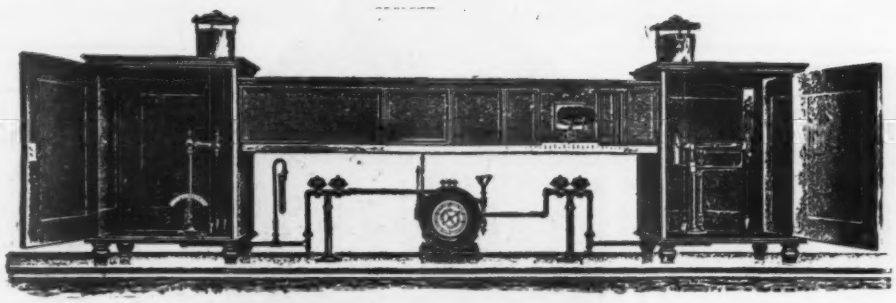
TOTAL HOURS DURING 1906.

By Table No. 1.

	Hrs.Min.
January	223.40
February	190.40
March	192.10
April	167.00
May	152.20
June	142.10
July	150.20
August	157.40
September	170.00
October	185.10
November	201.40
December	214.00
Total, yr.	2146.50







Closed Photometer For Light Room.

CIRCULARS SENT ON REQUEST.

PUBLIC LIGHTING TABLE.

OCTOBER, 1906.

Table No. 2.
NEW YORK CITY.
ALL NIGHT LIGHTING.

Day of Week.	Date.	Light.	Extinguish.
		P. M.	A.M.
Mon.	1	5.30	5.00
Tue.	2	5.30	5.00
Wed.	3	5.30	5.00
Thu.	4	5.30	5.00
Fri.	5	5.30	5.00
Sat.	6	5.30	5.00
Sun.	7	5.30	5.00
Mon.	8	5.20	5.10
Tue.	9	5.20	5.10
Wed.	10	5.20	5.10
Thu.	11	5.20	5.10
Fri.	12	5.20	5.10
Sat.	13	5.20	5.10
Sun.	14	5.20	5.10
Mon.	15	5.10	5.20
Tue.	16	5.10	5.20
Wed.	17	5.10	5.20
Thu.	18	5.10	5.20
Fri.	19	5.10	5.20
Sat.	20	5.10	5.20
Sun.	21	5.10	5.20
Mon.	22	5.00	5.30
Tue.	23	5.00	5.30
Wed.	24	5.00	5.30
Thu.	25	5.00	5.30
Fri.	26	5.00	5.30
Sat.	27	5.00	5.30
Sun.	28	5.00	5.30
Mon.	29	4.45	5.35
Tue.	30	4.45	5.35
Wed.	31	4.45	5.35

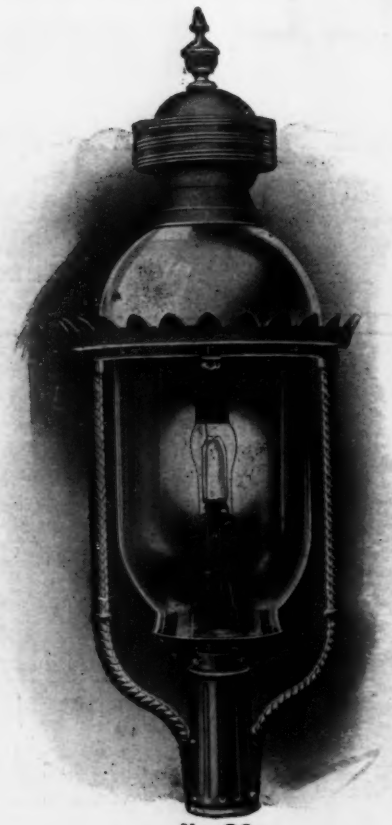
TOTAL HOURS DURING 1906.

By Table No. 2.

	Hrs.Min.
January	423.20
February	355.25
March	355.35
April	298.50
May	264.50
June	234.25
July	243.45
August	280.25
September	321.15
October	374.30
November	401.40
December	433.45
Total, yr.	3987.45

NEW YORK, 318 West 42d Street. BOSTON, 820 Beacon Building. PHILADELPHIA, Broad and Arch Streets. ST. LOUIS, 712 Roe Building. CHICAGO, 218 La Salle Street. SAN FRANCISCO, 512 Oak Street.

WELSBACH STREET LIGHTING COMPANY



No. 36.

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Controls and Operates the **Welsbach System of Street Lighting,**

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IT LIGHTS THE STREET.

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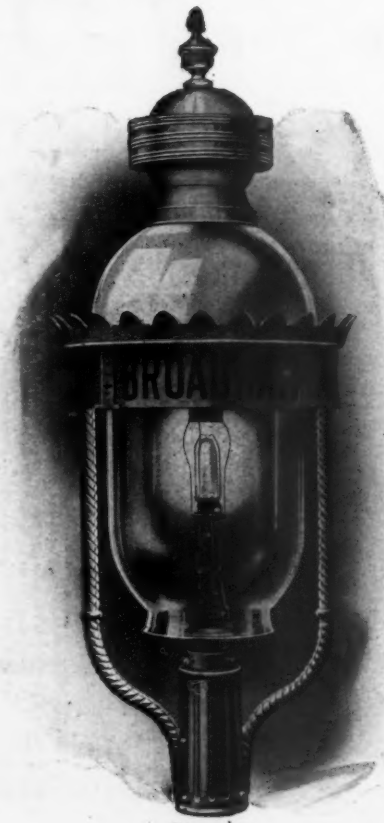
Correspondence Solicited from Gas Companies and Others interested in Municipal and Outside Lighting.



No. 38.

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1 No. 4 Pilot By-pass.
1 No. 4197 Mantle — Intensive Brand.
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1 Fourteen-inch GREEN Art Glass Shade, with six-inch Green Beaded Fringe.

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Finished in oxidized copper, oxidized brass, etc., 25 cents extra.

Shades in Ruby and Green--Ruby, Amber and other colors, without extra charge.

Special colors require a few days extra time to fill orders.

Green Shades will be shipped unless otherwise ordered.

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TOTAL SETS TO JULY 1, 1906, - - - - - 618

TOTAL DAILY CAPACITY TO JULY 1, 1906, 488,930,000 CUBIC FEET.

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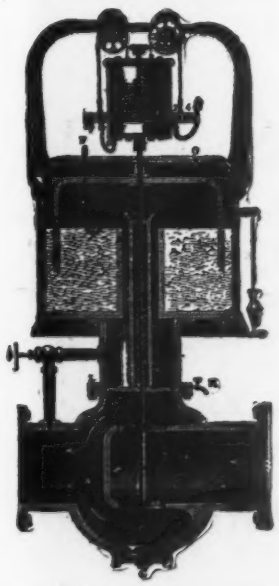

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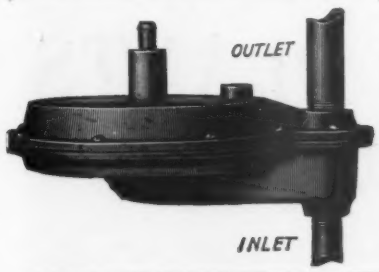

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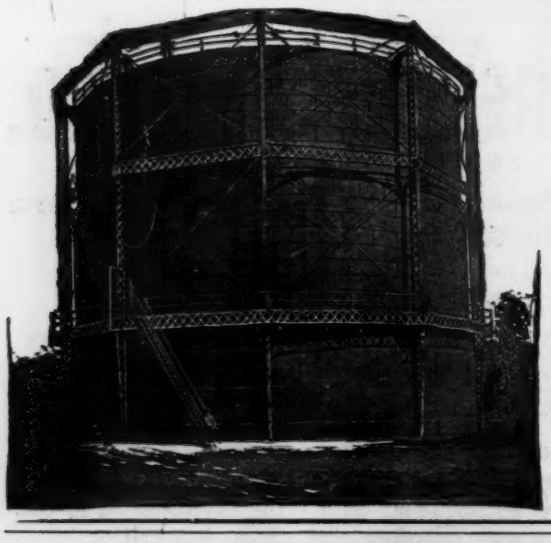

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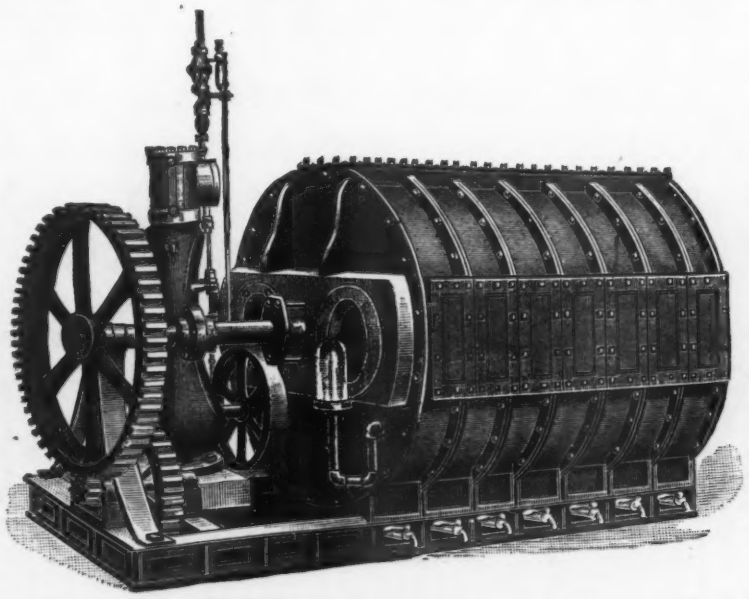

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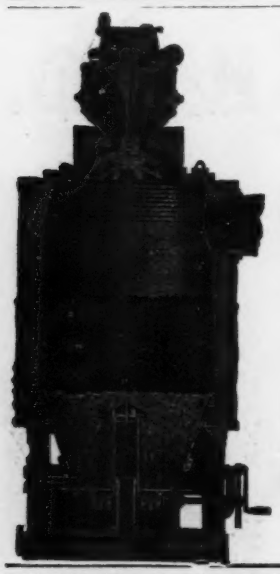

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LOWE CRUDE OIL WATER GAS is made exclusively from oil, no solid fuel, such as coal or coke, being used. In localities where oil can be procured at a sufficiently low figure to warrant the use of this gas making method, the results will be ideal, the gas giving a smooth, clear and brilliant light. As ordinarily made it is from 20 to 22-candle power and from 650 to 700 B.T.U. per cubic foot, and about 95 per cent. combustible, no air entering into its composition. The absolute minimum of labor is required, there being no solid fuels to handle. Many plants in units of daily capacities ranging from Sixty Thousand to Four Million cubic feet are in operation. Full information upon request.

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These valves are provided with double discs or gates, and are tight with the gas pressure on either side of them.

The discs are so arranged as to be free from their seats when being opened or closed, and are operated by a quick-acting mechanism. The valve stem extends outside of the bonnet, and serves as an index, showing whether the valve is closed or open, and the amount of opening. They are made of the following dimensions:

Size.	8 Inches.	10 Inches.	12 Inches	16 Inches.	20 Inches.	24 Inches	30 Inches.	36 Inches.
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It you use the Reeves slot attachments on them. Any good make of meter combined with the Reeves attachment makes the most perfect prepay meter ever manufactured.

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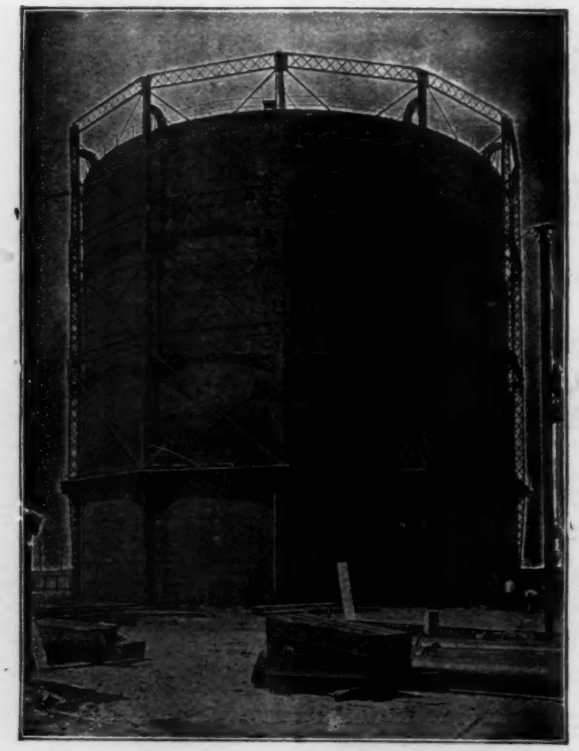

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Complete, with Steel Tanks.

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The gas registered agrees absolutely with the amount purchased by the coin.

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OVER 120,000 OF THESE METERS,

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DRY GAS METERS

Are adapted to the accurate measurement of

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Meters are equipped with suitable indexes for this class of service.

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They can be changed to Prepayment, Prepayment and Beal Straight-reading, or Beal Straight-reading only. Good job. Good time. Good people. Write us.

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Wet and Dry Gas Meters, Station Meters, Meter Provers,
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This Computer solves the following formula, which is applicable to Gas, Air and other elastic fluids, flowing through long pipes with high initial pressures:

$$\text{Discharge in cubic feet per hour at atmospheric pressure} = 33.3\sqrt{\frac{d^5 \times (p_1^2 - p_2^2)}{L \times w}}$$

Where d = diameter of pipe in inches,
p_1 = absolute initial pressure in pounds per square inch,
p_2 = absolute terminal pressure in pounds per square inch,
L = length of pipe in miles,
w = specific gravity of the fluid when air = 1.

To Find the Discharge from a Pipe and the Required Size of Pipe.

(1.) Set the specific gravity of the fluid opposite the length of pipe;
(2.) Bring the DIFFERENCE of the initial and terminal gauge pressures opposite the SUM of the initial and terminal gauge pressures;
(3.) Opposite any diameter of pipe will **now** be found the discharge in cubic feet per hour at atmospheric pressure; and
(4.) Opposite any desired discharge will also be found the required diameter of pipe.

Price of the Computers, in Cloth Case, 6½ x 8 inches, $5 Each, Net.

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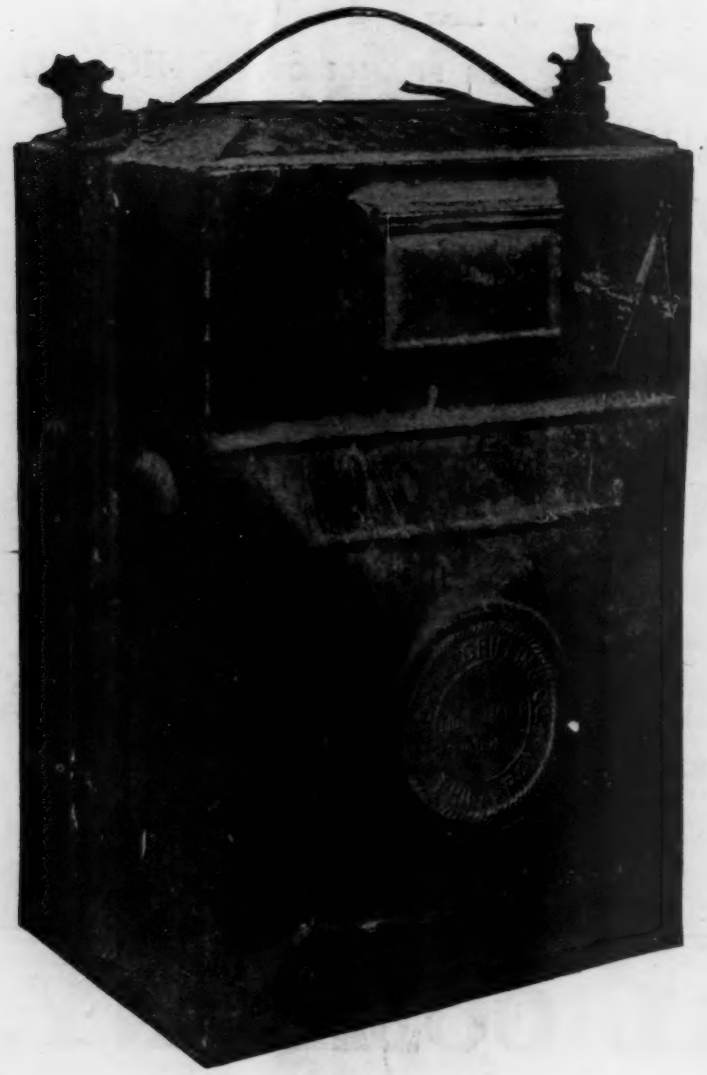

This is a photograph of a 3-light regular meter out of a lot of meters received from the Coatesville Gas Co., Coatesville, Pa., to be repaired and converted into prepayment meters.

AFTER.

This is the same meter after it has been repaired and converted into a new prepayment meter.

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